MARCH 2015

ISSUE 450



DAVID O'CONNOR ON LEADERSHIP

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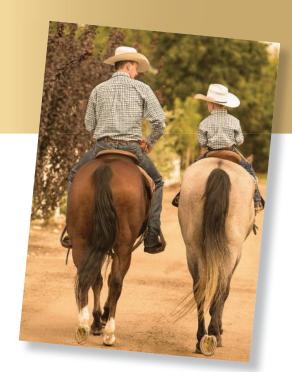
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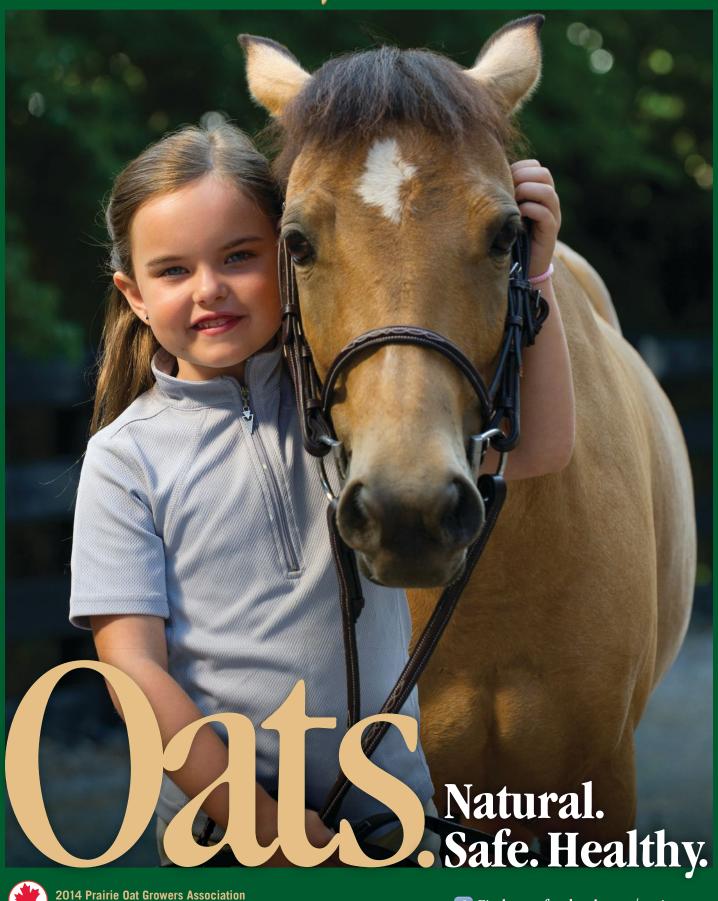
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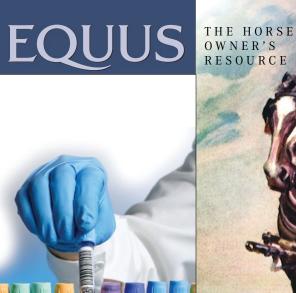


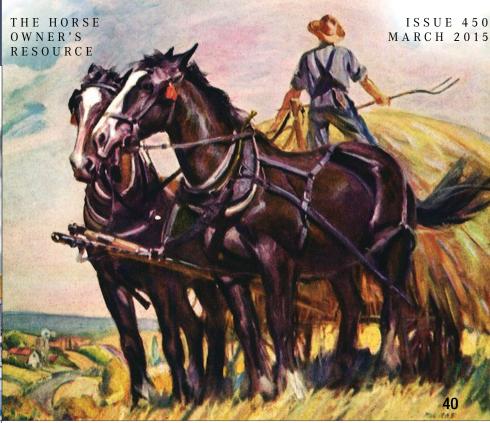
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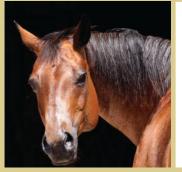
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FRAN JURGA'S

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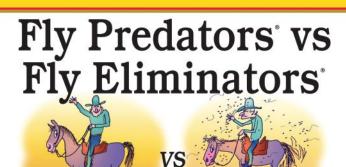
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EULETTERS

Straight toward a better ride

I want to thank physical therapist John Macy for sharing "Straighten Up and Ride Right" (EQUUS 447). He has given me the long-wanted explanation of why so many of us ride out of balance. For the past 26 years I have ridden with a lowered right shoulder. Two-pointing over uneven terrain on competitive trail rides always seemed awkward for me. You would think as an athletic person that I could have figured out the reason for the lowered shoulder, but it took this article to help me.

Macy explains our physical asymmetry in an incredibly simple and clear way, and he has given me the tools to correct myself. Already, I am finding his four-point correction suggestion feeling normal and comfortable. He was very right that at first changing my hip, lower back, sternum and head position was painful. However, that quickly became comfortable. It already seems so easy to drive the car, sit on a chair, and walk with my shoulders level!

I can't wait until spring when I can safely get my horses out on the trails. I am confident that my anxious Morgan mare will be happier with my new position, and my gaited gelding will also be able to slide into his faster gait more easily. I also suspect that my saddles will remain centered. My horses are going to be as happy as I am.

Jeanne Cole Glenfield, New York

Close call

"The Case of the 'Vicious' Horse" (Perspective, EQUUS 448) reminded me of an incident that occurred at my previous home in a suburb of Seattle, Washington. I was working in a cluster of bushes in my pasture when I heard my neighbor's voice. I looked up and

saw that he was standing with his three children next to my pasture fence. One of the horses, which belonged to my boarder, was grazing next to the fence, and my neighbor was just in the process of lifting his toddler over the fence to set her on the loose horse's back. I am not exaggerating at all.

I approached and warned him not to do that, and he pulled the child away before actually making contact with the horse. He said that he was going to hold onto the child. While I was explaining to him the unpredictability of horses, the horse continued to graze along the fence line. Suddenly, the horse reached out and grabbed the man's pant legperhaps out of curiosity or playfulness. My neighbor quickly pulled away and asked why the horse had done that. I pointed out that it was an example of how unpredictable horses can be. I also explained that the horse could easily have bitten one of the kids, too, out of the same sense of playfulness.

I never had a problem of this sort with this neighbor again. As a matter of fact, his kids used to hit their various play balls into my pasture and reach in if it was close enough. That never happened again. Instead, I would toss the balls back into their yard when I found them. I considered myself very lucky that nothing serious happened because I know that I could have been sued.

I now live in a rural area, but I have no expectation that I'm safe from another incident of this sort. Most people these days do not have a realistic understanding of horses.

Joan Fleming Rochester, Washington *****

Tell us what you think

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A SUBTLE EFFECT OF ENDURANCE COMPETITION



A Kansas State University study shows that the physiological effects of endurance competition can sometimes be found in an unexpected part of a horse's body: the eyes.

The researchers monitored the intraocular pressure (IOP) of 69 horses in five 50-mile endurance events in 2009. IOP is the

fluid pressure inside the globe of the eye and is measured with a tool called a tonometer in millimeters of mercury (mmHg).

"IOP is not static and actually fluctuates by a few

millimeters of mercury over the course of the day," says Rachel Allbaugh, DVM. "In many species it is highest in the morning and lower in the afternoon/evening, but this is opposite in horses."

The researchers monitored the intraocular pressure (IOP) of 69 horses in five 50-mile endurance events in 2009.

Prior to each competition, the study horses received a brief ocular exam, during which IOP was measured. Eye pressure was again measured at two points during each ride and once at the conclusion.

The data showed that IOP fluctuated in a manner that reflected finishing times: Most horses experienced an overall IOP decrease by the end of the ride, but those with shorter finishing times had a greater IOP decrease than did competitors who took longer to finish. In addition, horses who received "Best Condition" awards showed less IOP reduction than did horses who did not receive that award.

These differences could be due to hydration status and fitness level, says Allbaugh, although her study wasn't specifically designed to investigate those factors. "It would be very interesting to repeat an equine IOP and exercise study in a research setting with control of more variables," she says.

Reference: "Intraocular pressure changes in equine athletes during endurance competitions," Veterinary Ophthalmology, July 2014



BOTULISM SURVIVAL RATES

Horses with botulism who lose the ability to stand are far less likely to survive than those who remain on their feet, according to a retrospective study from the University of Pennsylvania's New Bolton Center.

Caused by the ingestion of toxins produced by *Clostridium botulinum* bacteria, botulism is characterized by progressive paralysis that eventually causes death as the horse loses the ability to swallow or breathe. Most equine

cases of botulism occur after horses ingest tainted hay or other forage.

The researchers examined the records of 92 horses with botulism admitted to the university hospital over a 24-year period. The data revealed that while the overall survival rate was 48 percent, it was significantly higher—67 percent—for horses who were still able to stand when they arrived at the hospital. Among horses who were unable to stand when they arrived, only 18

percent survived. The prognosis was best for horses who stayed on their feet throughout their hospitalization; they had a 95 percent survival rate.

The researchers also note that complications, such as pressure sores or colic, were common but did not influence survival rates.

Reference: "Outcome of adult horses with botulism treated at a veterinary hospital: 92 cases (1989-2013)," *Journal of Veterinary Internal Medicine,* November 2014

INCIDENCE OF RARE DENTAL PROBLEM STUDIED

New research from the University of Pennsylvania's New Bolton Center suggests that older geldings are at greater risk of developing the rare dental disease equine odontoclastic tooth resorption and hypercementosis (EOTRH).

EOTRH is a progressive dental condition in which the cementum that covers the surface of the teeth dissolves (resorption) or becomes overgrown (hypercementosis). The disease, which affects predominantly incisors and sometimes the canine teeth, can also destroy bone around the tooth sockets. Early signs include redness and swelling of the gums (gingivitis) with eventual development of ulceration and infection. Affected horses may become head shy and reluctant to eat because of dental/oral pain. Removal of the affected teeth is the generally recommended treatment.

For the study, researchers reviewed the records of horses admitted to the hospital for dental problems over a 12-year period. They found 18 cases of EOTRH. All but one

of the affected horses were geldings between the ages of 17 and 29, with a median age of 24. Lower incisors (mandibular) were typically affected before upper incisors (maxillary), but eventually the disease progressed to all incisors and in some cases the canine teeth. Some horses showed radiographic abnormalities of EOTRH with no clinical signs.

Based on these findings,



All but one of the affected horses were geldings between the ages of 17 and 29, with a median age of 24.

the researchers recommend regular oral examinations for signs of gum inflammation and, if a problem is suspected, radiographs to detect EOTRH early and begin treatment.

Reference: "Clinical treatment and prognosis of equine odontoclastic tooth resorption and hypercementosis," Equine Veterinary Journal, December 2014



WHEN MAINTAINING FOOTING, GO DEEP

A new study suggests that superficial harrowing of your arena may not be producing the results you expect.

Researchers at the Animal Health Trust in Newmarket, England, and the Swedish University of Agricultural Sciences in Uppsala collaborated to investigate the effects of harrowing, also called "dragging." In this common maintenance practice, a tractor or all-terrain vehicle is used to pull an attachment with tines over the arena surface to break up the top layer of footing. Regular harrowing is thought to increase the cushioning effect of the footing. reducing the risk of concussive injury.

The study was conducted in 11 different arenas that used one of two types of footing mixtures: sand with rubber, or waxed sand with fiber. "Various forms of sand with rubber are available and were used in the study arenas. Popular variations in the U.K. include sand with rubber chips mixed together or sand with rubber strips over it," says Carolyne Tranquille, BSc. "Waxed sand with fiber is wax-coated sand with strips of carpet fiber or felt mixed together."

Prior to harrowing, the researchers performed "drop tests" in each arena, measuring horizontal and vertical deceleration and loading to determine the shock-absorbing properties of the footing. "The test was carried out with an Orono Biomechanical Surface Tester, which is a hoof-shaped projectile that drops to the ground and is fitted with accelerometers and load cells," says Tranquille. "The system used in the study replicates loads and forces applied by

a 700-kilogram [about 1,550 pounds] cantering warm-blood to the arena surface."

The arenas were then harrowed using each facility's regular equipment and preferred techniques, and the drop tests were again performed. Comparing the results of each test, the researchers found that superficial harrowing did not have a significant effect on the properties of sand with rubber footing.

On the waxed sand with fiber footing, superficial harrowing caused significant decrease in maximum vertical deceleration and maximum vertical load, but the effect was short lived. "Our data indicated that the waxed surface returned to the same level of firmness as pre-harrowing in three drop tests," says Tranquille. "This suggests that superficial harrowing may not be the most

ULA DA SILVA/ARND BRONKHORST PHOTOGRAPH)

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suitable maintenance technique of this surface type. Harrowing with deeper tines may be more suitable."

Tranquille says her group is repeating the study using a larger number of arenas and standardized harrowing equipment and techniques, but the current available data suggests that a "onesize-fits-all" approach to arena maintenance may be misguided. "The fact that superficial harrowing had no effect on one surface type suggests that different types of surface may need different types of maintenance. Deep harrowing, leveling, rolling or even a combination of these may be more suitable for different surface types."

Reference: "Effect of superficial harrowing on surface properties of sand with rubber and waxed-sand with fibre riding arena surfaces: a preliminary study," *The Veterinary Journal*, October 2014

NEW WAY TO PREVENT ULCER RECURRENCE

Research from Louisiana State University suggests that a new supplement may help reduce the recurrence of gastric ulcers among horses that have undergone successful treatment with omeprazole.

Estimated to affect 60 to 90 percent of horses, gastric ulcers are erosions of the stomach lining caused by excessive acid production. Competition, intense training, transport and other stressors increase a horse's risk for ulcers, which often lead to weight loss, poor performance, a sour attitude and colic. Diagnosis is usually made through endoscopic⁰ examination.

A four-week regimen of the omeprazole (sold under the brand name GastroGard), which reduces the production of stomach acid, usually resolves gastric ulcers. But afterward some horses experience a recurrence because their acid secretions return to pretreatment levels or even higher, a phenomenon known as rebound acid hypersecretion (RAH). "Omeprazole treatment leads to a decrease in acid secretion and, as a result, G-cells of the stomach release gastrin-a hormone that stimulates acid

secretion—in the blood," explains Frank Andrews, DVM, MS, DACVIM. "With drug cessation, [acid production increases] leading to acid-related heartburn, acid regurgitation or dyspepsia. All this can lead to recurrence of ulcers in horses."

To determine whether SmartGut Ultra, a supplement containing a proprietary blend of sea buckthorn, L-glutamine, aloe vera, pectin and lecithin known as GastrAvert, can mitigate RAH, Andrews' team of LSU researchers selected eight horses with various levels of gastric ulcer severity. Their study was performed over two 42-day periods (a two-period, two-treatment cross-over design). For the first period, half of the horses received SmartGut Ultra and half received no treatment; for the second period, the treatment/nontreatment groups were swapped so each horse could serve as his own control.

For the first 14 days of the study, all the horses were given omeprazole. Next, the omeprazole was halted for two weeks. For seven days after that, the horses were placed on a restricted diet to stimulate ulcer formation. Then, for the final seven

days of the study, the normal ration was resumed. On the first and last days of the study, as well as three times during it, Andrews' team examined each horse's stomach lining with an endoscope to identify and score nonglandular ulcers and measured the pH of their gastric juices.

The data showed that at the beginning of the study ulcer scores were similar, but immediately after omeprazole treatment they markedly decreased to the same degree in both groups. However, by the fourth and fifth week of the study, when the omeprazole was discontinued and after the feed deprivation period, horses fed the supplement had significantly fewer and less severe ulcers than did the control horses.

Based on this research, Andrews advises starting horses on the SmartGut Ultra supplement when they are treated for ulcers, then continuing to feed it once treatment has ended.

Reference: "The effect of a supplement (SmartGut® Ultra) on the non-glandular gastric ulcer scores and gastric juice pH," American Association of Equine Practitioners 60th Annual Convention Proceedings, December 2014

MARCH 2015 EQUUS 450 15

The chirps from a nest full of baby birds can be a delightful sign of spring. Unless, of course, they come from a nest situated directly over your grooming space or feed-storage area.

You can't fault birds for nesting in your barn rafters; the space is dry, out of reach of most predators and within easy swooping range of spilled grain. But the mess a bird family makes through droppings can try the patience of even the most avian-friendly barn owner.

Droppings from birds aren't likely to spread disease to your horse here in North America, but they do contain fungi and other microorganisms that you'll want to avoid. And the mites sometimes found in the nests themselves may cause itchy reactions if they drop onto creatures below.

To make your barn less hospitable for nesting this spring, start rolling up the welcome mat now. Begin by keeping a fastidiously clean feed room, which will minimize the opportunities for free meals. Then block access to favorite nesting spots by stretching hardware mesh and bird netting below rafters. Remember that birds may simply set up housekeeping in another location inside the barn, so focus your efforts on specific areas you want to keep clear, such as over water buckets



or your saddle racks. You can also try using "scarecrows" of fake owls and hawks, but many birds see through this ruse and end up nesting right next to the very object that's meant to repel them.

If you notice a nest being built and the birds are not of a protected species, encourage them to relocate by removing it. You'll probably need to do this several times because many birds will attempt rebuild-

ing in the same spot before moving along. If there are eggs, chicks or fledglings in the nest, you'll need to reconcile with your

own conscience before disposing of it. The better option may be to move any buckets or stored items beneath it.

Keep in mind that barn swallows and many other birds eat an astonishing amount of insects each day. These insects would otherwise pester you and your horse and possibly transmit diseases. Also remember that nesting season is brief; once the babies leave the nest, most adult birds tend to relocate outdoors, making them-

selves less of a nuisance.

With this in mind,
you may opt to
tolerate, and
even enjoy,

your springtime tenants.

POP QUIZ BUTTON UP

It's a simple question, but one that may have never crossed your mind before: Where is your horse's **bellybutton**?

For the answer, see page 19.

A BETTER BRIDLE HOOK

A fancy tack room full of gleaming brass hardware may not be your style, but it is possible to be too utilitarian when it comes to keeping your gear organized. Hanging a bridle on a simple nail hammered into the wall will—over time—stress the leather of the crownpiece, encouraging it to split. A better bridle hook has a larger, rounded space to hold the crownpiece, keeping it closer to the shape it is while on your horse's head. Purchase a bridle hanger with these dimensions or craft your own by nailing a tuna can onto the wall.

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Flu strains are always changing. Give your horse the vaccine that's kept up.

Don't settle for an outdated influenza vaccine

Getting a flu shot each year is second nature for most people. Although it has been thought of as a risk-based vaccine for horses, in reality, most horses could be at risk. As human influenza flooded the news in late 2014, it's time to take a closer look at what makes some equine influenza vaccines work better than others.

Not your grandpa's flu strain

Influenza viruses, human and equine, change as time goes by through a process called antigenic drift. Influenza vaccines need to be constantly updated to reflect this change in the circulating flu strains.

Antigenic drift occurs in both human and equine influenza, and different organizations work to prevent flu outbreaks by determining the current circulating viruses and then recommending what strains should be included in vaccines.

For humans, the Centers for Disease Control and Prevention (CDC) predicts which strains will be circulating in the next flu season. However, because of antigenic drift, there is occasionally a new strain circulating that was not included in the year's vaccine. Such was the case late last year when the CDC announced the 2014 influenza vaccine would not be as effective against the current circulating flu strains.

For horses, the Organization of International Epizootes (OIE) has an Expert Surveillance Panel on Equine Influenza consisting of globally recognized influenza researchers. Their recommendation, based on monitoring influenza viruses and antigenic drift, includes vaccinating for Florida Clade 1 and Clade 2 strains of the equine influenza virus.

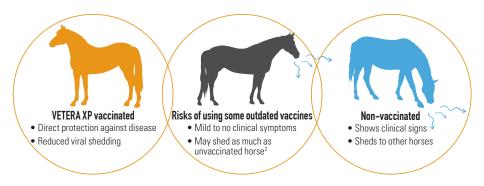
Outdated vaccines put horses at risk

If your influenza vaccine doesn't include the Florida Clade 1 and Clade 2 strains, it's outdated and your horse is not getting full protection. An outdated vaccine can put your horses at risk by means of:

- Viral shedding. Even if your horse does not get visibly sick, it can shed the virus to other horses as much as an unvaccinated horse.¹
- A lower level of protection. An outdated vaccine is less effective than one containing currently circulating strains.²

Boehringer Ingelheim Vetmedica, Inc. is the only vaccine manufacturer that has followed OIE Expert Surveillance Panel on Equine Influenza's recommendation to include both Florida Clade 1 and Clade 2 equine influenza strains in its vaccines. The Vetera® XP vaccine line provides direct antibody protection from the most recent strains of equine influenza to ensure your horse receives the highest level of protection.

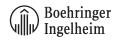
Vaccines with relevant flu strains and direct protection decrease viral shedding.



1. Cullinane A and Newton JR. Equine influenza — A global perspective. Vet Microbiol 2013;167(1–2):205–214. 2. Paillot R, Prowse L, Montesso F, et.al. Whole inactivated equine influenza vaccine: Efficacy against a representative Clade 2 equine influenza virus, IFN-gamma synthesis and duration of humoral immunity. Vet Microbiol 2013;162(2–4):396–407.

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HANDS ON

FILL 'ER UP

To quickly and easily fill a hay net before a trailer ride, turn an empty water bucket over and invert the net over the bottom of the bucket. Then stack the flakes on the bucket and pull the net up over the stack.—Jessica Spears, Brandon, Florida

Send your suggestions for inexpensive horse-care substitutes as

well as hints for saving effort and time to Hands On, EQUUS, 656 Quince Orchard Road, #600, Gaithersburg, MD 20878; Fax: 301-990-9015; E-mail: EQLetters@EquiNetwork.com. Senders of published items will receive selected EQUUS merchandise.

A QUESTION The trailer is OF WRAPS

hooked up, the hay nets hung and the gas tank

is full. All that's left is to wrap your horse's legs before loading him up and hitting the road.

But maybe not. Shipping wraps and bandages do protect lower legs from trauma in the trailer, but they aren't always necessary and in some cases may do more harm than good. When making a decision about shipping wraps,

consider the following questions:

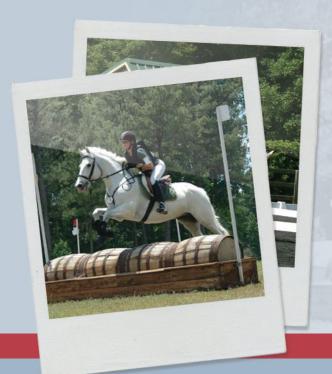
Do they fit well and can I put them on properly? This is perhaps the most important consideration. Shipping boots that are too large or small, or wraps that aren't applied appropriately, can trip or entangle a horse, causing injury. If your shipping boots typically end up on the trailer floor by the end of the ride, they don't fit well and you're probably better off not using them. And if you aren't very confident in your wrapping ability (ask you veterinarian for an assessment

if you're unsure) keep practicing and forgo shipping bandages for now.

What's the weather like? If you are shipping on a hot day, your horse is going to be even hotter under boots or wraps. Also keep in mind that riding in a trailer is an athletic event for a horse, so he will be producing more body heat than if he were simply standing. Leg coverings may not increase his overall body temperature, but studies have shown that tissues directly under boots and wraps—including tendons can heat up, and potentially overheat, in hot weather.

What kind of hardware is my horse wearing on his feet? Shoes that have bars, trailers or a bigger fit can injure both the horse wearing them as well as a travel companion on the other side of a partial partition. Bell boots can help, but if the shoes look like a hazard, they probably are.

What kind of traveler is my horse? Seasoned shippers going short



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PADDING: To do their job well, shipping wraps need to fit and be applied properly.

distances aren't likely to scramble and step on themselves. Likewise, traveling companions who are comfortable in the trailer aren't likely to step on each other.

Shipping wraps or bandages may not be necessary in those situations. For inexperienced or fussy travelers, however, leg protection is important. Also, keep in mind that while it's not unusual for a freshly wrapped or booted horse to take a few exaggerated steps as he first moves out, some horses never become comfortable with leg coverings and move unnaturally or even panic whenever they are applied.

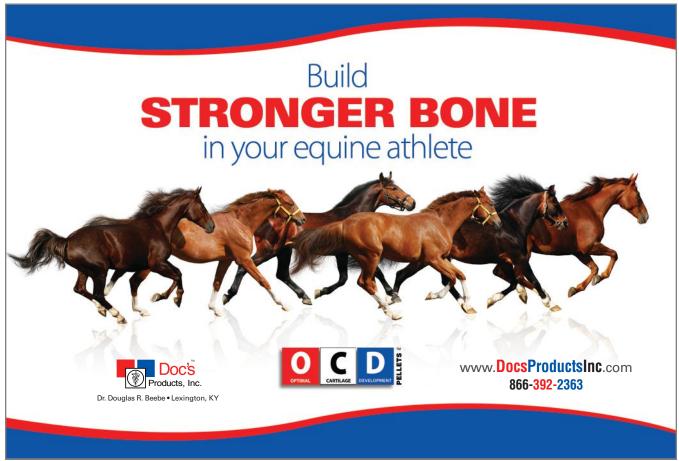
As with many horsekeeping issues, the question of whether to use shipping bandages or wraps has no hard-and-fast answer. In the end, it's a judgment call you'll have to make for every trip and every horse.

POP QUIZ

Answer

Like most mammals, an equine fetus receives nourishment via the umbilical cord, which is attached to the placenta. The cord is broken during foaling, and afterward the remnant of the stump falls away and the opening closes, just as it does on newborn babies. To locate your horse's bellybutton, look along the midline, a few inches in front of the sheath or udder. You'll see either a slight depression—an "innie"—or a lump of what might be mistaken for scar tissue or even a sarcoid, an "outie."





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- Reduces soreness and swelling
- Helps boost circulationStimulates healing







Treatment trade-off

mp, my Trakehner gelding, had been a generous gift from a friend about five years ago. He was 19 then, and in addition to being a sweet and handsome guy, he was a talented and experienced upper-level dressage horse. He was also safe and sane under saddle, and his new job was to be my schoolmaster.

I moved Imp into a training barn, and all went well. He did have his quirks—he didn't always get along with his pasturemates, he often demanded to be brought in well before his outside time was up, and he tended to have strong opinions about just about everything. But he was a dream to ride.

Then, just months later, Imp suddenly turned up head-bobbing lame.
The veterinarian diagnosed a tear in his sesamoid ligament. Despite all our rehabilitative efforts, the injury would never heal enough for Imp to be brought back into even light riding. I brought him home to be a pasture horse, hoping that with enough time off, he might heal on his own. But one year stretched into several, and he never became fully sound. His strong personality simply became part of the atmosphere at the barn.

"What is wrong with his eye?" The question came from a friend who visited us in the fall of 2012. She had taken to Imp right away, loving his wavy long hair, regal bearing and quirky personality. But she'd also noticed a subtle change that, in my day-to-day care, I had missed.

I took a closer look. The inside corner of Imp's left eye was angled downward, pulled by the skin around the eye. Thinking the skin had somehow adhered to the fascia⁰ below, I Surgery to remove the rare tumor behind my horse's eye carried the risk of serious complications or worse, but if successful it would add years to his life.

By Joni Larson



gently massaged the area, trying to get it to loosen.

When that didn't help, I called my veterinarian, Katie Collier, DVM, of Fieldstone Veterinary Service in Grand Ledge, Michigan.

Wait and see

After a close examination that included x-rays, Collier confirmed that something was indeed very wrong. She explained that she saw a mass growing in the orbit (socket) behind Imp's left eye and that it was pushing the eyeball outward, causing the skin around it to stretch.

We talked about treatment options, but none seemed reasonable or practical at that point. Trying to remove the mass would be very difficult without removing the eye, too, but Imp didn't seem to be in any pain, so putting him through surgery that drastic didn't seem right. We decided to just monitor the situation to see if the eye would get worse. Imp had worked hard during his life, and I was happy to focus on simply making his last years as pleasant as possible.

But as the months passed, Imp's eye began bulging more noticeably. Michigan State University, with its large animal ophthalmology service, was only about a half hour away, and the worry that I hadn't explored all

HAPPY DAYS: Now fully recovered from surgery, Imp is enjoying his retirement. the options nagged at me. So I made an appointment there in the spring of 2013.

Ophthalmology resident Freya Mowat, BVSc, PhD, examined Imp. She told me the mass

behind his eye was most likely some type of cancer, and we discussed a variety of diagnostic options. None were appealing. A biopsy of the tumor would be difficult, given its location, and treatments to shrink it would likely have no significant impact.

Surgery to remove the mass would be painful and risky—and there was no guarantee that they could reach all of it or save the eye. If the tumor never got any worse, it might still be best to just

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let it be. But, I was told, if we left the tumor alone, it could also continue to grow in size until it began to affect Imp neurologically, or it could cause him so much pain his quality of life would be severely diminished.

With all of this information swirling in my head, I declined further diagnostics and made the decision to take Imp home without pursuing any treatments. The plan was to manage his pain as well as we could, with dexamethasone⁰ when necessary, until it might be time to consider humane euthanasia. I went home with literature on cancer and the services the hospital offered for making end-of-life decisions.

Imp seemed oblivious to his condition, and he remained just as demanding and charismatic as always. As the months passed, his eye was slowly pushed outward, while the skin around it stretched down. By fall, he started to become a bit more subdued, presumably from discomfort, but never to the point where it seemed to be his "time."

A commitment to act

By winter it was clear Imp's eye was getting worse. It had pushed out considerably, and there was some discharge from the eye and left nostril. But little else had changed. Imp was not deteriorating noticeably in any other way, and he wasn't showing any neurological deficits from the growth of the tumor. I began to hope he might remain comfortable for a few more years.

Collier looked him over, and we discussed the possibility of removing Imp's eye, but not the tumor, to alleviate any discomfort caused by the dislocation. That surgery should be simpler, we thought, and the stay at the MSU hospital would be short. I made an appointment for the late spring, when I would have time off from work to focus



entirely on Imp and his recovery.

But suddenly the surgery wouldn't wait. Imp's condition worsened when the eye protruded so far that the third eyelid, also called the nictitating membrane, detached and was sometimes flipping outside the socket. I rescheduled the procedure for the earliest available appointment, in March 2014.

When we arrived, Mowat and her colleagues, including resident Ryan Boyd, DVM, examined Imp carefully. They noticed an ulcer on his eyeball, most likely a result of his inability to close his eyelids, that was causing him some pain. They also said it was time to remove his eye and, as Mowat explained to me, also the tumor below it.

The tumor, she suspected, was likely a rare type of cancer called an extraadrenal paraganglioma (EAPG), which affects nerve cells. The good news was that these tumors tend to be slowgrowing and don't quickly spread to other parts of the body. On the other hand, EAPGs are very invasive locally. If Imp's tumor ran out of room in the eye socket, it could spread in the other direction, eating through the bone of his skull toward his brain.

Mowat also said that surgery to remove the tumor would be difficult. EAPGs tend to be vascular and bleed extensively when disturbed. In fact,

POPEYED:

The mass behind Imp's eye grew so large that it pushed the globe out of place and displaced the nictitating membrane.

some horses bleed so profusely during the procedure that they need blood transfusions to save their lives. Mowat conferred with surgeon John Stick, DVM, DACVS, and they agreed that they could try to preemptively control any hemorrhage by ligation of the left carotid⁰ artery—closing the

vessel off with a few dissolvable stitches before the tumor was removed. Even so, a donor horse would have to be on hand in case Imp needed a blood transfusion.

What I had hoped would be an easy, in-and-out procedure under local anesthesia had now become a complicated, risky surgery. If it worked, however, Imp might have many more happy, healthy years ahead of him.

I agreed it was worth a try.

Tricky surgery, rough recovery

I waited in a room adjacent to the surgical suite as Imp was prepped and placed under general anesthesia and the surgeons began their work. I wasn't able to see what was going on, but I was OK with that.

After about two hours, someone from the surgical team came out to tell me the procedure was finished. Imp had lost substantially more blood than would be expected during a normal eye extraction, but not enough to require a transfusion. Mowat confessed later that it was unsettling for an ophthalmologist, who is not used to encountering so much blood in a procedure, to have to deal with such active bleeding. But the team's plan worked well. By closing off the artery prior to removing the tumor, then packing the space tightly

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before



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with gauze and covering it with a pressure bandage, they were able to stem the blood flow. As they'd suspected, they were not able to remove the entire tumor, but they were able to get enough that it would take years, maybe even decades, for the lesion to grow back to a problematic size.

I'd like to say Imp looked better when I saw him, but he really didn't. His breathing was labored and he was sweating slightly. His vital signs—an elevated pulse and respiratory rate—indicated he was probably in pain due to the packing in his eye socket, Mowat explained, but it was necessary to control any bleeding that might persist. He also had a heart murmur. It was unclear if the murmur had been there all along or was caused by the ligation of the carotid.

Imp was happy to be back at the barn, but we would still encounter a few more bumps in his recovery.

The sweating and labored breathing continued over the next couple of days, but even so, Imp was his usual charismatic self, digging into his bran mash with the energy of a horse half his age, playing with it and getting more on me than he did in his mouth.

Two days after the surgery, it was time to remove the gauze packing. This could have disrupted the surgery site enough to cause Imp to bleed profusely again, but fortunately, the procedure was uneventful. The veterinary team filled the orbit with Gelfoam, a material that helps stop bleeding and can be left inside closed surgical wounds, and sewed the skin shut.

Removing the gauze reduced Imp's pain, and his breathing returned to near-normal. His heart murmur also subsided to the point where, after five days in the hospital, he could go home.

IN FOCUS:

EXTRA-ADRENAL PARAGANGLIOMA (EAPG)

- ▶ **Definition:** adrenaline-producing tumors that grow in the cells of the sympathetic nervous system (which helps to monitor and control the internal organs)
- ➤ **Signs:** Although EAPGs can occur anywhere along the sympathetic nervous system, in horses the tumors are more likely to become apparent when they develop in the orbit, the cavity in the skull that holds the eyeball and related tissues. They are reported to be the most common tumor of the equine orbit. The most common sign is exophthalmia, the protrusion of the eyeball outward from the socket. Bleeding or other discharge from the nose may be present. Vision is not commonly affected in earlier stages of the disease, unless the tumor affects the optic nerve. Once the protrusion is pronounced, the horse may develop chronic inflammation of the cornea and conjunctiva (the membranes that line the eyelids and eye socket). Older horses are more likely to be affected.
- ➤ Causes: unknown
- ▶ **Diagnosis:** observation of the signs, coupled with imaging to view the tissues behind the eyeball. Options include x-rays, ultrasound, CT (computed tomography) and MRI (magnetic resonance imaging) scans.
- ▶ Treatment: Tumors that cause no pain or other serious difficulties for the horse can be left untreated. Surgery is the only option to remove a tumor, and removal of the eyeball is also usually necessary. Complete cure is unlikely with treatment, because tumors often extend deep into the orbit and toward the brain, but prognosis is fair since the residual tumor is slow growing.

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Imp was happy to be back at the barn, but we would still encounter a few more bumps in his recovery. First, he started bleeding from the nose, which was expected, but not to this extent and not this long after the surgery. At a follow-up visit to MSU, however, an endoscopic exam of his nasal cavity showed nothing unusual, and the bleeding stopped a few days later.

After another week, the area around and under the stitches began looking abnormal to me. Collier came out to take a look. She thought the site looked fine and removed the stitches along with a lot of dead skin. Underneath, the site had been healing well.

Then a few days later, I discovered that the incision site had opened slightly and a large amount of gelatin-like pus had poured out onto Imp's face. It appeared that, with the removal of the stitches, the incision site had weakened enough to allow an infection that had been trapped inside to work its way out.

After consulting with Collier, I applied a warm compress to the incision site several times a day to draw out the remaining infection, and we started another round of antibiotics. That combination seemed to resolve the problem, and from that point onward, Imp's recovery went smoothly.

t is now six months after the surgery, and Imp is pretty much back to his normal self, minus one eye. He still demands to come in from his pasture on his schedule, pins his ears when being fed and talks to anyone who will listen. He suffers all the one-eyed-horse jokes cheerfully. But he does have one new habit: When he doesn't want to do as I ask, he turns his head purposefully to the right. I guess he figures if he can't see me, he can ignore me. I hope he has many more years to live comfortably and happily as my quirky, retired dressage horse.

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A common language

Good communication and leadership will help you train your horse to overcome his fears, no matter their origin.

hen you're working with horses, two decisions take priority. First, from the moment you begin interacting with a horse, you must use your line of direction. Second, you must decide how you get there. You can't just wander aimlessly; you need a plan. That's true whether you're thinking about jumping a course or how you will train the horse.

As you go on this journey, be aware that you take on a daunting responsibility as a rider: You are the custodian of the horse's trust, honesty, integrity and dignity. You must respect the horse and make sure he has

everything he needs. History has too many By David O'Connor examples of horses' trust and dignity being taken Whether a horse's fear involves riding or stable

> management or anything else,

think "small"

when you're

helping him to

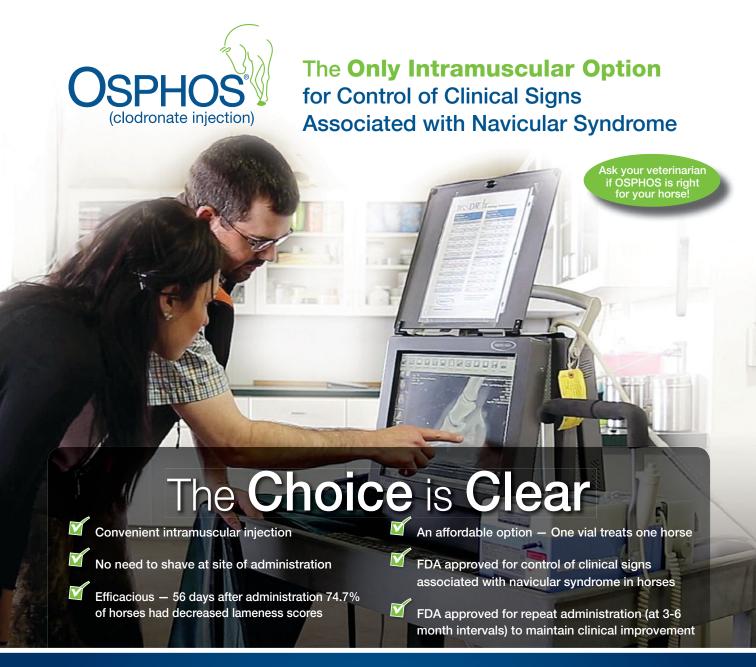
overcome it.

away by force. Thankfully, we live in a more enlightened age, where people are learning that you don't force horses to do anything. Instead, you communicate what you want. And, because horses are such genuine souls, they pretty much want to do it for you.

My wife, Karen, and I enjoy helping others learn how to understand and appreciate their horses the way we do ours. When we teach camps, people are with their horses seven hours a day. Being with them so much, either sitting in the saddle or holding them at the end of the line, gives them opportunities to gain insights into the character of animals they may have owned for years.

Most people don't spend enough time with their horses to understand them properly. Take a lesson from the Native Americans who just sit quietly in the pasture and study their horses. Try doing the same thing; watch how your horse behaves. You'll learn about his personality and how he thinks. You'll see his social interactions with other horses and the way he reacts to a new stimulus. All this information will be very helpful as you train him.

Studying your horse while he is in the pasture, away from your influence, will make you much more aware of his personality type. Try this experiment: If you have four horses in the field and put a bucket of feed out there with them, typically you'll find that one horse goes right to it, two of the others run around complaining but not getting anything done, and one stands off in a corner, waiting for everyone else to be finished.



Navicular syndrome is a multifaceted disease and the treatment options are not always clear. When radiographic signs indicative of bony changes associated with navicular syndrome are present, Osphos is a clear choice. Osphos is a bisphosphonate designed for convenient IM administration. Osphos inhibits bone resorption by binding to calcium phosphate crystals (inhibiting their formation and dissolution), and by exerting direct cellular effects on osteoclasts.





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CAUTION: Federal law restricts this drug to use by or on the order of a licensed veterinarian. For client-friendly information on navicular syndrome and lameness exams please refer to www.equinelameness.com. As with all drugs, side effects may occur. In field studies, the most common side effects reported were signs of discomfort or nervousness, cramping, pawing, and/or colic within 2 hours post-treatment. Osphos should not be used in pregnant or lactating mares, or mares intended for breeding. Use of Osphos in patients with conditions affecting renal function or mineral or electrolyte homeostasis is not recommended. Refer to the prescribing information for complete details or visit www.dechra-us.com.

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Bisphosphonate For use in horses only.

Brief Summary (For Full Prescribing Information, see package insert

CAUTION: Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian.

DESCRIPTION: Clodronate disodium is a non-amino, chlorocontaining bisphosphonate. Chemically, clodronate disodium is (dichloromethylene) diphosphonic acid disodium salt and is manufactured from the tetrahydrate form.

INDICATION: For the control of clinical signs associated with navicular syndrome in horses.

CONTRAINDICATIONS: Horses with hypersensitivity to clodronate disodium should not receive OSPHOS.

WARNINGS: Do not use in horses intended for human consumption.

HUMAN WARNINGS: Not for human use. Keep this and all drugs out of the reach of children. Consult a physician in case of accidental human exposure.

PRECAUTIONS: As a class, bisphosphonates may be associated with gastrointestinal and renal toxicity. Sensitivity to drug associated adverse reactions varies with the individual patient. Renal and gastrointestinal adverse reactions may be associated with plasma concentrations of the drug. Bisphosphonates are excreted by the kidney; therefore, conditions causing renal impairment may increase plasma bisphosphonate concentrations resulting in an increased risk for adverse reactions. Concurrent administration of other potentially nephrotoxic drugs should be approached with caution and renal function should be monitored. Use of bisphosphonates in patients with conditions or diseases affecting renal function is not recommended. Administration of bisphosphonates has been associated with abdominal pain (colic), discomfort, and agitation in horses. Clinical signs usually occur shortly after drug administration and may be associated with alterations in intestinal motility. In horses treated with OSPHOS these clinical signs usually began within 2 hours of treatment. Horses should be monitored for at least 2 hours following administration of OSPHOS.

Bisphosphonates affect plasma concentrations of some minerals and electrolytes such as calcium, magnesium and potassium, immediately post-treatment, with effects lasting up to several hours. Caution should be used when administering bisphosphonates to hospess with conditions affecting mineral or electrolyte homeostasis (e.g., hyperkalemic periodic paralysis, hypocalcemia, etc.).

The safe use of OSPHOS has not been evaluated in horses less than 4 years of age. The effect of bisphosphonates on the skeleton of growing horses has not been studied; however, bisphosphonates inhibit osteoclast activity which impacts bone turnover and may affect bone growth.

Bisphosphonates should not be used in pregnant or lactating mares, or mares intended for breeding. The safe use of OSPHOS has not been evaluated in breeding horses or pregnant or lactating mares. Bisphosphonates are incorporated into the bone matrix, from where they are gradually released over periods of months to years. The extent of bisphosphonate incorporation into adult bone, and hence, the amount available for release back into the systemic circulation, is directly related to the total dose and duration of bisphosphonate use. Bisphosphonates have been shown to cause fetal developmental abnormalities in laboratory animals. The uptake of bisphosphonate into fetal bone may be greater than into matemal bone creating a possible risk for skeletal or other abnormalities in the fetus. Many drugs, including bisphosphonates, may be excreted in milk and may be absorbed by nursing animals.

Increased bone fragility has been observed in animals treated with bisphosphonates at high doses or for long periods of time. Bisphosphonates inhibit bone resorption and decrease bone turnover which may lead to an inability to repair micro damage within the bone. In humans, atypical femur fractures have been reported in patients on long term bisphosphonate therapy; however, a causal relationship has not been established.

ADVERSE REACTIONS: The most common adverse reactions reported in the field study were clinical signs of discomfort or nervousness, colic and/or pawing. Other signs reported were lip licking, yawning, head shaking, injection site swelling, and hives/pruritus.



Distributed by: Dechra Veterinary Products 7015 College Boulevard, Suite 525 Overland Park, KS 66211 866-933-2472

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He's submissive, but he's not a whiner like the two who were running around.

If you have a "bucket" horse—if yours is the one who eats first—you may have your hands full. You need to be a leader when you're dealing with him. If you're not a natural born leader, he'll try to take charge.

When you're looking to buy a horse, ask the people selling him whether he's a follower or a leader. That will help you to tune in to what kind of personality he has. And be honest about assessing your own personality as you try to find a match that's compatible for you. If you're not honest with and about yourself, your horse will make you honest—probably the hard way.

Communication and leadership are especially important when you need to help a horse overcome fear.

Whether a horse's fear involves riding or stable management or anything else, think "small" when you're helping him to overcome it. For instance, if your horse has a ditch problem, don't take him right to a scary ditch. Instead, scale down the exercise until he has more confidence. You might start with a ditch that's nothing more than a tire rut. From there you would introduce a ditch that is revetted at one side and sloping on the other. Make sure your horse is confident with whatever you have been doing before you move on to the next challenge.

Try to do the easiest thing first to build that confidence. Always start jumping up a bank rather than down a bank, for instance. If your horse is reluctant to approach a particular obstacle, start by finding a comfort zone from which he can gradually get closer to the problem. And start out walking by it, not at it. Get the two of you used to meeting the stimulus by degrees.

Here's another fear problem you may encounter: clippers. The noise and vibration they make is huge and the big power cord can look like a snake, but you can take apart this problem and fix it piece by piece.

First, get an extension cord, gather it in one or both of your hands, and rub it all over the horse in a gentle manner. When he's OK with that, find something that has a vibration, like those little massage gizmos you can get at discount stores. You can even put a cell phone on silent, so it vibrates when it rings. Put whatever vibrating device you're using on your horse's shoulder first, then his neck, and finally his muzzle and ears (or whatever other sensitive area you want to clip).

When he's got that down pat, start a clipper. Keep it away from him at first, so he can hear the noise and get used to it but not have it on top of him. Then gradually bring it closer, and finally get him accustomed to the feel as you did with the vibrating gizmo.

Always desensitize in increments. Your efforts will fail if you give your horse too much to absorb too quickly. Rough stuff and using a twitch or tranquilizers are not the answer. Those may be fast fixes that get a job done once, but next time you'll undoubtedly wind up with more trouble than you started with.

Follow this line of thinking when you're jumping. Start with low and narrow obstacles to build confidence. Then regulate your challenges by changing height, distance and width gradually. Never over-face your horse—or yourself.

Finally, we find that it always helps to avoid reacting to what the horse is doing but instead to analyze what he is thinking. Put yourself in his head. Think what he thinks; see what he sees. Horses react to their own senses, so try to become sensitive to how his senses operate rather than relying just on your own reactions. In the end, you're trying to learn the language of your horse, rather than trying to teach him the language of people.

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TACK&GEAR

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Heads up

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from Lami-Cell, offers an ABS outer shell molded as a single piece, with seven large vents to maximize airflow. The low-profile design provides added support for the back of the skull and neck, and a dial-fit system adjusts to accommodate head sizes from toddlers to adults. Available in S to L. in plum, navy, black or brown. Call 800-223-2102 or visit www.partrade.net.





Helmet (suggested retail, \$43.95), from IRH Helmets, which features a front venting system that allows air to circulate over the top of the rider's head. A removable, washable liner wicks moisture away from the skin, and a dial-fit system allows for an easy, perfect fit. Available in sizes small/medium (6 5/8 to 7) or medium/large (7 to 7 3/8), in matte black, matte latte, purple, platinum and blue mist. Visit www.irhhelmets.com.



from Charles Owen, now offers center panels with shiny silver or black fabrics. The jR8 also features a low-profile design with weather-resistant microsuede side panels and an adjustable nylon harness. Available in sizes 6 3/8 to 7 1/2 and in round-fit sizes 6 7/8 to 7 1/4. Sparkly color options include black with black bling center; black with shiny silver center; or navy with shiny silver center. Call 800-793-4181 or visit www. charlesowen.com.

For a traditional look that maximizes safety, the One K Racer **Skull Cap** (suggested retail, \$224.95) is made with an injection-molded polycarbonate and ABS composite shell, stain-

less steel mesh and a padded harness lined with synthetic suede. Other features include a washable, moisture-wicking, antimicrobial liner and seven vents for cooling. A textured surface provides grip for silk covers. Available in sizes S to XL, in gray. Visit www.onekhelmets.com. "

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UNIPRIM®

POWDER FOR HORSES

(TRIMETHOPRIM/SULFADIAZINE)

DESCRIPTION: UNIPRIM Powder contains 67 mg trimethoprim and 333 mg sulfadiazine per gram.

UNIPRIM Powder is a combination of trimethoprim and sulfadiazine in the ratio of 1 part to 5 parts by weight, which provides effective antibacterial activity against a wide range of bacterial infections in animats.

Trimethoprim is 2,4 diamino-5-(3, 4, 5-trimethoxy/benzyl) pyrimidine.

ACTIONS: Microbiology: Trimethoprim blocks bacterial production of tetrahydrofolic acid from dihydrofolic acid by binding to and reversibly inhibiting the enzyme dihydrofolate reductase.

Sulfadiazine, in common with other sulfonamides, inhibits bacterial synthesis of dihydrofolic acid by competing with para-aminobenzoic acid.

Trimethoprim/sulfadiazine thus imposes a sequential double blockade on bacterial metabolism. This deprives bacteria of nucleic acids and proteins essential for survival and multiplication, and produces a high level of antibacterial activity which is usually bactericidal.

Although both sulfadiazine and trimethoprim are antificiate, neither affects the foliate metabolism of animals. The resonance are animals to not synthesize folia caid and cannot, therefore, be derived affected by sulfadiazine; and although animals must reduce their dietary folic acid to tetrahydroficia acid, trimethoprim does not affect this reduction because its affinity for dihydroficiate reductase of mammals is significantly less than for the corresponding bacterial enzyme.

Trimethoprim/sulfadiazine is active against a wide spectrum of bacterial pathogens, both gramnegative and gram-positive. The following in vitro data are available, but their clinical significance is unknown. In general, species of the following genera are sensitive to trimethoprim/sulfadiazine:

very Sensitiv	ne .
Escherichia	
Streptococcus	
Proteus	
Salmonella	
Pasteurella .	
Shigella	
Maamaahilus	

Staphylococcus Maisseria Klabsiella Fusiformis Corynebacterium Clostridium Bordetella Moderately Sensitive Moravalla Nocardia

Mycobacterium Leptospira Pseudomonas Erysipelathrix INDICATIONS AND USAGE: Trimethoprim/sulfadiazine is indicated in horses where potent systemic antibacterial action against sensitive organisms is required. Trimethoprim/sulfadiazine is indicated where control of bacterial infections is required during treatment of:

Acute Strangles
Respiratory Tract Infections

Acute Urogenital Infections Wound Infections and Abscesses

rimethoprim/sulfadiazine is well tolerated by foals.

CONTRAINDICATIONS: Trimethoprim/sulfadiazine should not be used in horses showing marked liver parenchymal damage, blood dyscrasias, or in those with history of sulfonamide sensitivity.

ADVERSE REACTIONS: During clinical trials, one case of anorexia and one case of loose feces following treatment with the drug were reported.

Individual animal hypersensitivity may result in local or generalized reactions, sometimes fatal.

Anaphylactoid reactions, although rare, may also occur. **Antidote:** Epinephrine.

Post Approval Experience: Horses have developed diarrhea during trimethoprim/sulfadiazine treatment, which could be fatal. If fecal consistency changes during trimethoprim/sulfadiazine therapy, discontinue treatment immediately and contact your veterinarian.

PRECAUTION: Water should be readily available to horses receiving sulfonamide therapy.

ANIMAL SAFETY: Toxicity is low. The acute toxicity (LD50) of trimethoprim/sulfadiazine is more than 5 g/kg orally in rats and mice. No significant changes were recorded in rats given doses of 600 mg/kg per day for 90 days.

Horses treated intravenously with trimethoprim/sulfadiazine 48% injection have tolerated up to five times the recommended daily dose for 7 days or on the recommended daily dose for 21 consecutive days without clinical effects or histopathological changes.

Lengthening of clotting time was seen in some of the horses on high or prolonged dosing in one of two trials. The effect, which may have been related to a resolving infection, was not seen in a second similar trial.

Slight to moderate reductions in hematopoietic activity following high, prolonged dosage in several species have been recorded. This is usually reversible by folinic acid (leucovorin) administration or by stopping the drug. During long-term treatment of horses, periodic platelet counts and white and red blood cell counts are advisable.

TERATOLOGY: The effect of trimethoprim/sulfadiazine on pregnancy has not been determined. Studies to date show there is no detrimental effect on stallion spermatogenesis with or following the recommended dose of trimethoprimsulfadiazine.

DOSAGE AND ADMINISTRATION: The recommended dose is 3.75 g UNIPRIM Powder per 110 lbs (50 kg) body weight per day. Administer UNIPRIM Powder orally once a day in a small amount of stateback for the control of the cont

Dose instructions: One 37.5 g packet is sufficient to treat 1100 lbs (500 kg) of body weight. For the 1125 g packets and 12 kg boxes, a level, loose-filled, 67 co score contains 37.5 g, sufficient to treat 1100 lbs (500 kg) of body weight. For the 200 g, 400 g, and 1200 g lars, according to the 100 lbs (500 kg) of body weight. For the 200 g, 400 g, and 1200 g lars, according to the 100 lbs (500 kg) of body weight. Since product may settle, gentle agitation during scooping is recommended.

The usual course of treatment is a single, daily dose for 5 to 7 days.

Continue acute infection therapy for 2 or 3 days after clinical signs have subsided.

STORAGE: Store at or below 25°C (77°F)

HOW SUPPLIED: UNPRIM Powder is available in 37.5 g packets, 1125 g packets, 200 g jars, 400 g jars, 1200 g jars, 2000 g pails and 12 kg boxes. Apple Flavored UNPRIM Powder is available in 37.5 g packets, 1125 g packets, 200 g jars, 400 g jars, 1200 g jars and 2000 g pails.

CAUTION: Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian.

ANADA # 200-033, Approved by FDA







DUSTY PERIN

DECODING YOUR HORSE'S BLOODWORK

rawing blood for laboratory testing has been a routine part of equine veterinary care for decades.

Along with a physical examination and review of a horse's history, bloodwork can offer valuable insights into the health and function of the body's systems. What's more, routine screenings can detect brewing trouble long before a horse might show outward signs of anything amiss.

By Heather

Smith Thomas

The procedure is simple enough the blood is drawn, placed into test tubes, and then a few days later your veterinarian calls with new information and possible recommendations

or treatments. And
many blood samples are taken
when a horse
is perfectly
healthy.
"It's good
to have
baseline
values that
are taken when
your horse is

normal because then

you can compare them to additional results taken later on in his life and see how things have changed," says Liz Arbittier, VMD, CVA, of the University of Pennsylvania's New Bolton Center. "For instance, certain organ values that are creeping up in older horses can be a harbinger of problems."

But blood analysis also has many specialized applications. "We run screening tests for any number of reasons," says Arbittier. "We might run tests on a horse with a fever of known or unknown origin, one with an obvious disease process such as nasal discharge or cough, one who is lethargic or has lost weight, or for a prepurchase exam or as part of annual exams on geriatric horses, for instance. Once we have baseline values in a sick horse, we can use some of them to help monitor how a certain treatment is working."

Of course, your veterinarian will decide what sort of blood analysis needs to be done for your horse and will explain what the results mean for his health. And, as useful as blood tests can be, they do have their limitations. However, the following overview of the more common blood tests will help you understand what tests your veterinarian has called for and why.

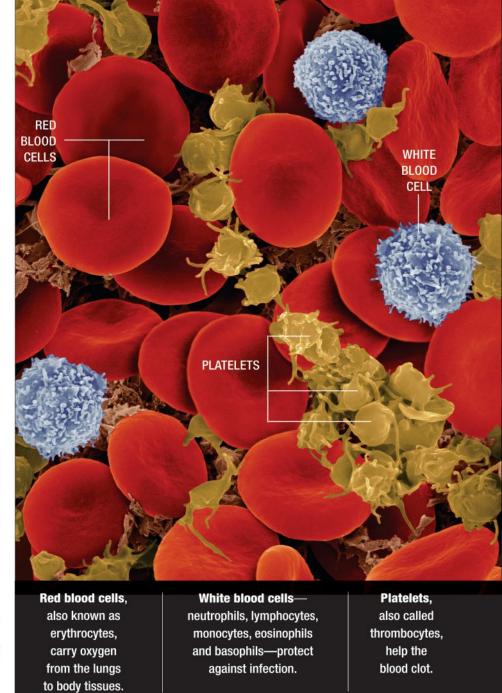
COMPLETE BLOOD COUNT (CBC)

The CBC quantifies the types of cells in a blood sample—specifically the red cells, the white cells and the platelets. Run on a sample of whole blood that has been blended with an anticoagulant, the CBC is a general-purpose screening tool that can yield a great deal of information about a horse's general health. "Results of the CBC can help determine a variety of physiological responses," says Peggy Marsh, DVM, DACVIM, DACVECC, of Equine Medical Associates in Lexington, Kentucky.

The results of a CBC are broken out into several different components. For example, a test may describe the total number of red blood cells (RBC count) as well as hemoglobin, the total amount of oxygen-carrying protein in the blood. Another indicator is the hematocrit, also called the packed cell volume (PCV), which is the percentage of the whole blood that consists of red cells. More specific tests, such as mean corpuscular volume (MCV), might look at the average sizes and composition of the red blood cells.

Low red cell and hematocrit values might indicate anemia; high values might point toward dehydration. But this information is only a starting point. "The red blood cell information can sometimes help us focus on specific diseases, but is not very definitive," says Katherine Wilson, DVM, DACVIM, of the Virginia–Maryland Regional College of Veterinary Medicine.

In fact, she adds, "RBC count is probably the least helpful information because horses usually don't have big changes in red blood cell numbers. It is not uncommon for horses to have an RBC count a little lower than normal



range, however. The term we use for low RBC is anemia, but unless the count gets very low, a horse doesn't necessarily need to be treated for that condition. A lot of diseases or any chronic long-term disease can cause mild anemia. Usually if we see mild anemia on the bloodwork and the horse has other issues, the anemia is just an indication that we need to fix/treat

Blood analysis also focuses on the white blood cell count (WBC count), a measure of the number of the

another problem."

infection-fighting white blood cells in the sample. This test may also be broken down into a white blood cell differential, which is a count of the numbers of each of the five specific types of white cells: neutrophils, lymphocytes, monocytes, eosinophils and basophils.

An elevated WBC count usually indicates infection or inflammation, and a closer look at the specific types of cells can yield clues to the type of process at work. "Usually if there is some kind of infectious disease, one or two types of white blood cells may be elevated,"

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says Wilson. "If it's a bacterial infection like pneumonia, the neutrophil count may be elevated. If it's an early stage of bacterial infection, we would see a lot of immature neutrophils in the blood, because the body is putting out a lot more of them to try to fight the infection."

Also, says Arbittier, "The percentage breakdowns of different WBCs can help diagnose an allergic or parasitic process if one particular white cell, the eosinophil, is high."

A low WBC count could be an indication of endotoxemia, a systemic inflammatory condition that develops when toxins released by some intestinal bacteria get into the bloodstream. "When horses become endotoxic, the white cells go out into the tissues rather than staying in the blood, so we'd see a low count in the blood sample," says

LAYERS: For some tests, a centrifuge is used to separate the different types of cells in a blood sample. **PLASMA** WHITE BLOOD **CELLS AND PLATELETS RED BLOOD CELLS** Wilson. "I usually become more concerned if a horse has

a low white cell count than if it's high, because a low count usually means the horse is very sick at the time you are taking the blood sample."

Finally, a CBC will show the platelet count, the total volume of the cells that are instrumental in forming clots and stimulating healing after injury. More specific tests-mean platelet volume (MPV) and platelet distribution width (PDW)—record the average sizes of the platelets. A low platelet count, which can be caused by certain drugs or toxins, may leave the horse at risk of uncontrolled bleeding. Platelet counts usually return to normal soon after the drug is discontinued. Abnormally high platelet counts are rare in horses.

SERUM CHEMISTRY PROFILE

Focusing on the clear, yellowish liquid left after all the solid blood cells are removed by clotting and then centrifuging, the serum chemistry profiling can identify levels of various proteins and enzymes, electrolytes and other biochemicals that indicate overall health as well as individual organ function.

"Results of the serum chemistry help me evaluate systems such as the liver, kidneys or muscles," says Marsh. "It helps us know if the body is in good health or if there is something abnormal going on that needs further exploration." Some of the major values a veterinarian may look for include:

• Proteins. The tests measure levels of the proteins albumin and globulin. "It is important to check protein levels because protein in the blood is responsible for keeping fluid inside the blood vessels and not leaking out into body tissues," says Wilson. "Usually the horse loses protein from the blood through severe diarrhea. Horses can also lose it through the kidneys if the kidneys are not functioning properly."

Low protein levels may also signal a liver problem. "The protein is produced in the liver, so if the protein is low this might mean the horse has a liver problem—if there are other things on the profile that are consistent with liver damage," says Wilson.

The albumin/globulin ratio can also help to distinguish health issues that will affect both together, such as dehydration, from illnesses that will affect one more than the other.

Another important protein is fibrinogen, which aids the formation of blood clots. "Fibrinogen is an acute-phase protein generated by the equine liver that can indicate an inflammatory

process if it is moderately elevated and an infectious process if it is significantly elevated," says Arbittier. "This value can be utilized not only to diagnose an infection but also as a relatively inexpensive tool to gauge the horse's response to treatment."

Serum amyloid A (SAA) is another protein that is useful for gauging a horse's level of infection and inflammation. "New advances in running this test have made it more readily available to practitioners and it is an extremely sensitive marker of inflammation and infection," says Arbittier.

"Fibrinogen and more recently SAA are known as acute phase response, since these may rise more quickly than any changes in the CBC," says Claudia True, DVM, of Woodside Equine Clinic in Ashland, Virginia. "Fibrinogen and SAA become elevated with inflammation, infection, neoplasia [abnormal growth] and trauma."

Plasma proteins and plasma fibrinogen may also be recorded on the CBC test. "This is roughly the same thing, whether measured in the CBC or the serum chemistry profile," says Wilson.

• **Electrolytes.** These dissolved ions, including sodium, potassium, chloride, bicarbonate, calcium and phosphorus, are essential to many biological functions, and abnormally high or low levels can have a significant impact on health. "Electrolytes in the blood can change quickly, due to dehydration or loss through diarrhea, or via urine, if the kidneys are not functioning normally," says Wilson. Elevated potassium may indicate kidney disease or muscle damage. Bicarbonate is important because it helps to regulate the blood pH. Too much bicarbonate creates an alkaline environment (metabolic alkalosis) and too little makes the blood acidic (metabolic acidosis), both of which

can have serious consequences.

- **Glucose.** This sugar is an energy source inside the horse's cells. Serum glucose fluctuates widely in normal individuals, in response to factors such as stress, pain or recent feeding, so an elevated reading on a single test isn't necessarily significant. However, chronically elevated levels of glucose may also indicate a metabolic disorder, such as insulin⁰ resistance (IR).
- Kidney waste products. Urea, which is checked for in a blood urea nitrogen (BUN) test, and creatinine are two waste products found in the blood and filtered out by the kidneys to be eliminated in the urine. If levels of these substances are elevated, it may mean that the kidneys are not functioning properly. It could also mean that the horse is dehydrated.
- **Liver enzymes.** The liver produces several enzymes, commonly abbreviated as AST, ALP and GGT. "If these values are elevated this usually means there has been some damage to the liver," says Wilson. "Those cells essentially rupture and those enzymes are floating around in the bloodstream at higher concentration. One thing we emphasize with our students is that just the fact those enzymes are elevated or there is evidence of liver damage doesn't necessarily mean the liver is not functioning normally. It may still be able to do all the things it needs to do in spite of the damage, and it can sometimes heal from that damage. It might be temporary."
- **Bilirubin.** Another indication of liver health is a pigment called bilirubin, which is formed from the breakdown of red blood cells. Elevated levels can mean unusual loss of red cells or liver dysfunction. However, in horses, unlike other animals, elevated levels of bilirubin often isn't serious. "This value



can increase fairly rapidly when horses go off feed, and this is something that is unique to the horse," says Wilson. "Often we get phone calls from veterinarians who don't work on horses much or owners who see the bloodwork and note that the bilirubin is above normal range and are concerned about liver disease. If the horse is off feed for 24 to 48 hours, that value will increase, but this is just a temporary elevation."

• Muscle enzymes. The most important muscle enzyme is creatine kinase, but there are others as well, including some of the same ones that are produced in the liver. "These enzymes are found inside the cells, and when the cell is sick or damaged, these leak into the bloodstream. Thus if these enzyme levels in the blood are increased, this could indicate cell damage," Marsh says. "However, a lot of these enzymes are not found in just one place in the body, so we have to put this all together to figure out what's happening."



COLOR CODING

When your veterinarian draws blood from your horse for testing, you might notice that she's filling several different tubes and carefully labeling each one. You might also notice that she's selecting tubes with rubber tops of different colors.

There is a reason for this: Each color-coded tube comes preloaded with additives to prepare the blood for different types of testing. "We might use a tube that keeps the blood from coagulating, such as a purple-top tube, for the

CBC," says Peggy Marsh, DVM, DACVIM, DACVECC, of Equine Medical Associates in Lexington, Kentucky. Different anticoagulants, in green or light blue tubes, might be used for other tests on blood plasma, which is the fluid that is left after uncoagulated whole blood cells have been removed via a centrifuge, leaving the platelets behind. Grav-topped tubes contain chemicals that prevent the breakdown of glucose.

A red-topped tube, which contains no anticoagulants,

might be used to collect blood for serum tests, which is the fluid left behind after all of the cells, including the platelets, have been removed by clotting. "Often we'd keep just the serum when we want to look for certain antibodies." savs Marsh. "There is a difference in the tests looking for antibodies versus looking for the specific organism. This could require a PCR [polymerase chain reaction] test. For that, we need cells, so we'd collect blood for a PCR test in a purple-top tube."

TESTS FOR **SPECIFIC DISEASES**

A number of tests are available to determine whether a horse has been exposed to particular organisms that cause diseases. "The disease bloodwork falls into two categories," says Wilson. "One is testing for antibodies against that disease, produced by the animal after being exposed to that disease. The other category is tests that look for the organism itself. By far the majority of tests are simply testing to see if antibodies are there."

Sometimes, a veterinarian might run more than one type of test to confirm a result. "Many disease processes have multiple types of tests available to help diagnose them, and new literature is constantly being published as to which methods are most reliable," Arbittier says. The options include:

• Enzyme-linked immunosorbent assay (ELISA). The ELISA test consists

of a plastic plate with columns of wells that come from the manufacturer coated with a reactive substance, usually an antigen⁰. When fluid samples from the horse are placed in the wells, any antibodies present will bind with the antigens. Then, the wells are emptied and refilled with other solutions that will bind to any antibodies present to produce a color change that will be visible to the naked eye. The result is an on/off positive or negative. However, false positives are possible, and a light color change might be an inconclusive result.

ELISA tests can also be used to measure a horse's hormone levels, such as insulin or adrenocorticotropic hormone (ACTH), to look for metabolic diseases. "Leptin [a hormone produced by fat cells] is another thing the lab can look for. Some are offering this as an insulin resistance panel when checking for equine metabolic syndrome," True says.

• Western blot or immunoblotting. Like ELISA, Western blotting works by providing antigens to bind to antibodies in a horse's blood in a way that can be seen. The biggest difference is that the Western blots first separate the proteins in the horse's blood into bands on a sheet of gel so that veterinarians can see exactly which ones are causing the reactions. This offers more specificity than the ELISA.

• Indirect immunofluorescent antibody technique (IFAT or IFA).

IFAT is another, newer method that utilizes the antigen-antibody bond to produce a visible result. In this test, fresh or frozen tissue samples are bathed in solutions that contain antibodies combined with fluorescent dyes, which then bind with any antigen proteins on the surface of the cells. The fluorescent dyes can then be visualized by any of several imaging techniques. Both IFAT and ELISA are used to test horses for antibodies to equine⁰ protozoal myeloencephalitis (EPM).

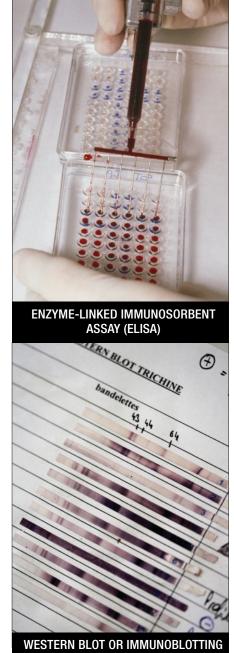
The downside of all of these tests

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is that the presence of antibodies in a blood sample does not necessarily mean that the horse has that disease. For example, many horses are exposed to the organisms that cause EPM or Lyme disease, but only a fraction develop signs of illness. "It depends on the disease, but in general terms [a positive result] simply means that the animal became infected at some point in the past and developed antibodies to fight the disease, or it could indicate that the animal actively has the disease right now," says Wilson. "With some diseases it can sometimes be difficult to determine which scenario this is."

Of course, vaccination can also influence antibody level. "There are many tests that become difficult to interpret if the horse has been vaccinated," Wilson adds. "It's hard to determine whether the antibodies are from the vaccine or from previous exposure, or active disease—unless it's a disease for which there's no vaccine." Some antibody tests need to have multiple samples run at different times in the disease process to interpret whether the animal has the disease currently or has been previously exposed.

Generally speaking, if an animal has been recently exposed or infected, the antibody levels should increase over a period of a couple of weeks. Blood from the horse at the time of examination can be compared to blood taken two weeks later and an increase in antibody levels to a specific disease would support infection with that disease. A constant level of antibodies over time might be more indicative of exposure to the disease previously, or previous vaccination. The major downside to having to take multiple samples is that by the time the results are obtained, the horse may be better or much worse; it makes it difficult to diagnose the



disease at the time the horse is showing signs of illness. There is, however, an alternative approach:

• **Polymerase chain reaction (PCR).**Inlike these other tests, which test a

Unlike these other tests, which test a horse's blood, bodily fluids or tissues for the presence of antibodies, PCR is a method of determining whether a disease-causing organism itself is present in the sample by identifying its DNA. PCR has myriad applications in research, but in veterinary practice it is used mainly to diagnose bacterial and viral infections that would be difficult to identify by other means. "If the pathogen is detected, it would be much more indicative of an active infection,

for most diseases, because the pathogen is still there," says Wilson.

But the test does have its limitations. "The caveat: These really only test for the DNA of the organism, so you could have a dead bacterium or dead virus that isn't causing disease but still shows up," Wilson adds. "That's not usually the case, with most of the diseases that horses get. It would be something to think about, however, if the horse is positive on a test for a disease that affects the lungs but has diarrhea, for instance. It doesn't fit together." You have to look at the whole picture.

PUTTING IT **ALL TOGETHER**

Lab reports based on blood tests can yield very specific and detailed information about what might be going wrong inside your horse. However, the results still need to be interpreted carefully and compared to the horse's outward signs of illness.

"Some owners want us to come take a blood sample and tell them what their horse has, but it's not that easy," says Marsh. "One of the main points to remember is that doing bloodwork is just one piece of the puzzle when we are trying to figure out what is going on with that horse."

The blood tests are part of the sequence a veterinarian goes through to diagnose a horse's illness. "We do a physical exam, get a history, and then we can run a CBC and a serum biochemistry profile to try to determine which body system is sick," says Wilson. "Then we might individually test for the most common diseases that would affect that body system in that particular horse, depending on his exposure to other animals, what part of the country he is in, etc. Unfortunately, you can't just run a screening test and

WHEN "ABNORMAL" IS OK

When any labwork is done on your horse, his results will be compared to a "normal" range. "The general process to figure out the 'normal' range for most of those tests is to gather as large a number of healthy horses as you can and run bloodwork on all of them," says Katherine Wilson, DVM, DACVIM, of the Virginia-Maryland Regional College of Veterinary Medicine. "Usually about 95 percent of those horses would fall within a certain range." But that also means that some healthy horses will be outside the norm. "About 5 percent of horses that are totally normal might be either a little higher or lower," Wilson says.

When evaluating your horse's blood results, your veterinarian will take this possibility into consideration. "If just one thing is slightly abnormal on one of the blood tests, and it doesn't fit with anything else on the bloodwork or with what else the horse is doing, we usually don't worry about that one," says Wilson.

But this is also why it's a good idea to have some routine bloodwork done annually—to record your horse's normal values. Then, your veterinarian will be

better equipped to notice significant changes when he's ill. "Sometimes it's not necessarily that the blood value was abnormal; it may be just increasing from the last time we saw it," Wilson says. "This might still be within the normal range, but it could be a big increase for that horse if he has always been lower."

At Woodside Equine
Clinic in Ashland, Virginia,
says Claudia True, DVM, "we
offer wellness packages for
our clients—they get physical examinations, vaccines,
dental checks and fecal egg
counts, and they can add a
CBC and a blood chemistry.
With these we would be
looking for underlying abnormalities such as liver and
kidney issues." But some

of the results they have seen were surprising:

"It was interesting to see the bell curve on these blood tests, across the board." True says. "We had a couple of horses with really low white counts. If those were sick horses and you found that number, you'd assume the horse had a viral infection or overwhelming bacterial infection. One of the counts was so low that I was very concerned and talked to our internal medicine specialist about it. I went back a couple weeks later and checked again, and the white count was still fairly low. Apparently this is normal for that horse, even though it was way down on the bell curve for all the horses."

the answer shows up. You have to request a test for what you think it could be, and you don't want to run too many tests or this becomes expensive for the horse owner."

But even all of that might not be enough: "Often we are presented with animals that we test for all the things we know could cause the clinical signs they have, and everything comes back negative," says Wilson. "We are still scratching our heads to try to figure out what is making the horse sick."

Sometimes a veterinarian might also test other bodily fluids. "We might need a urine sample or perhaps a sample of lung fluid, or the fluid that lines the GI tract," says Marsh. "We can test different things for each specific situation."

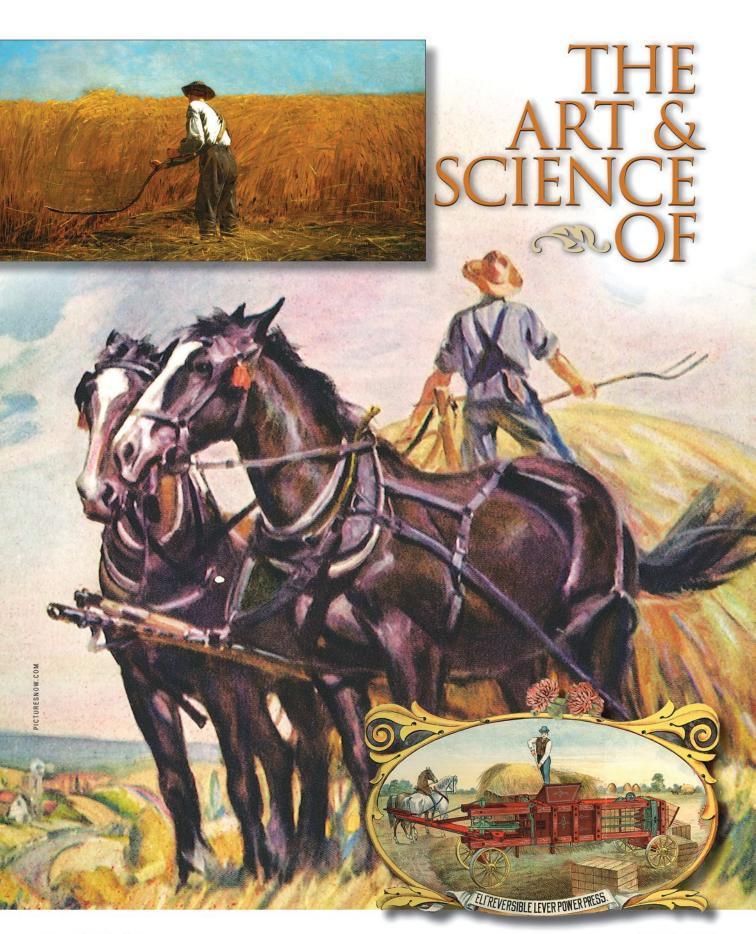
A urinalysis might be especially important to look at in conjunction with bloodwork. "The minimum database for most animals—especially dogs and cats and humans-is generally a CBC, a serum biochemistry profile and a urinalysis," says Wilson. "Unfortunately, we tend to forget the urinalysis with horses, but we really need to look at that in comparison with the blood to determine kidney function and hydration status. There are also other things we can see in the urine. If there are red blood cells or white blood cells in the urine, this might indicate inflammation or infection of the urinary tract. Ideally, it would be nice if we

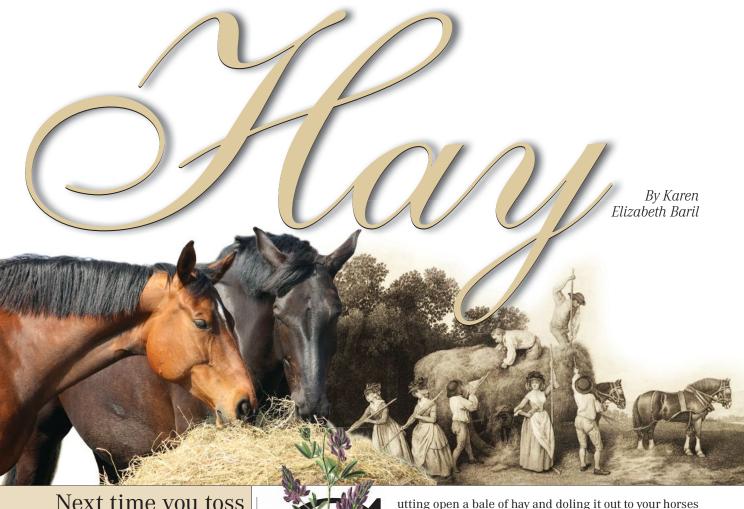
could get blood and urine from every horse we need to test."

Then your horse is ill, you want to do anything you can to restore his health as quickly as possible. Fortunately, modern laboratory tests are one of the fastest and most effective ways to zero in on the source of a problem. They also help keep tabs on recovery.



DUSTY PEF



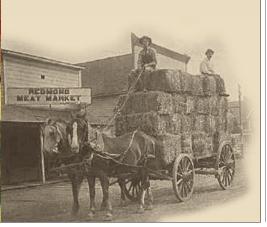


Next time you toss your horse a flake of hay, take a moment to appreciate the renewable resource at the heart of the horse world.

you're fortunate enough to live where there's yearround pasture, you probably do it several times a day,
especially in the cold months. And, if you're like me, you
probably don't think too much about hay unless you're
shopping for it, storing it or hefting it around the barn.

"Hay is humble stuff it's true" says — pre-automotive era Without it armies

is one of those chores we all do countless times. Unless



"Hay is humble stuff, it's true," says
Steven Hoffbeck, a history professor at
Minnesota State University Moorhead
and author of *The Haymakers: A*Chronicle of Five Farm Families. "When
an old farmer from northern Minnesota
found out I'd written a book about haymaking he said, 'Imagine that—that
someone could write a book about the
lowly subject of making hay."

But throughout history, hay was much more than just animal feed: Dried fodder was the main fuel of the pre-automotive era. Without it, armies couldn't move any faster than men could march, and all overland transportation would be limited to regions where grazing was available. Hay also made large scale agriculture possible: Cattle and other livestock couldn't survive winters in northern climates without hay, and horses would be a luxury only the wealthiest could afford.

And even for the modern horse owner, hay is more than just a convenience. I can't imagine trying to keep my horses nourished without a full hay shed during a long winter here in the northwest hills of Connecticut. Even my easy-keeping Haflingers would be in trouble. And droughts, like the ones in California, would take on a whole new urgency without a stockpile of hay.

Yet that familiar square bale we all rely on is a modern invention—barely more than 100 years old. Before that, hay was stored loose, in haystacks or piled into haylofts, one pitchfork full at a time. And your whole town's fortunes might rise or fall based on the year's hay crop. In fact, the more you understand about the long history of hay and haymaking, the more you'll appreciate the convenience of our neat, stackable, shippable bales.

Here's a brief overview of the history of hay, from the hand-held scythe to the gas-powered tractor and into the new millennium.

THE EARLIEST **HAY DAYS**

When animals become domesticated, they need to be fed year-round. In an agrarian community, your local climate would dictate how you cared for your

Alfalfa was first cultivated around 2000 B.C. in its native area, which is now Turkey and the eastern Caucasus Mountains.



livestock. If your tribe was nomadic, you might have spent your life following your flocks or herds to better grazing throughout the year. In the mountains, you might have moved your animals to high meadows in the summer and brought them down to closer pastures in winter. In warm climates, your animals might have been turned loose to browse throughout the year. In colder lands, you might have

cut "leaf hay"—leafy branches from deciduous trees such as alder or willow—and allowed them to dry as winter forage for your ruminants.

And, as archaeological evidence shows, if you lived in Iron Age or Bronze Age villages in northern climates such as Scandinavia, you might have cultivated fields of local grasses or sedges specifically to harvest as forage. Meanwhile, alfalfa was first cultivated around 2000 B.C. in its native area, which is now Turkey and the eastern Caucasus Mountains. The Romans encountered alfalfa hay when they expanded their territory into that region, and soon this ideal horse fodder was grown across much of their empire.

By the Middle Ages hay was a staple crop in European communities that relied on oxen and horsepower. But harvesting a field of grass was labor intensive. You might have used a sickle —a type of curved blade mounted on a short handle used primarily to harvest grain—but the most state-of-the-

art technology was a longer handled tool

With a scythe, hay could be harvested more efficiently.

Alfalfa grass (Medicago sativa)

called a scythe. The scythe allowed you to work standing up, and you could also bring down a larger swath in one swing of the blade. One person could now easily mow an acre, perhaps two. But mowing was still intensive labor.

"The early farmers invited their neighbors and made the day a party," says David Tresemer, author of *The Scythe Book: Mowing Hay, Cutting Weeds, and Harvesting Small Grains with Hand Tools.*"They'd start mowing at morning light, work hard for several hours and then rest around noon for a very long lunch—three hours or so—stopping to eat and drink beer. The beer was important. It was intended to bring on a nap. After the nap, they'd work again until sundown."

Once the hay was mowed, you would rake it by hand into windrows to dry before forming it into haystacks for the winter. In later years, you might load your hay into wagons and bring it home to store in your hayloft or silo. "To avoid rotting, the farmer tossed the hay into a mound, keeping the center of the stack high and well packed while building it," says Hoffbeck. "This way most of the settling would take place on the sides or edges so that rainwater would shed along the outside walls of the stack."

in wind the soo moldy good for TO Eur ber of corchar ryegra. Hamps found in a new as in that ear a qualithe 17.

Timothy grass (Phleum pratense)

Drawing by Thomas Jefferson of his invention: the moldboard plow

And, just like today, you had to hope that the weather would offer you a stretch of

warm, sunny days so you could get the hay in safely. "Dry weather was always best for haying," says Hoffbeck, "but not too windy because the wind could blow the leaves right off the hay. The race was against rainfall. If you had the hay

in windrows and a heavy rain came, the sodden hay could rot, turning moldy and worthless. Then it would be good for animal bedding only."

TO THE NEW WORLD

European settlers brought a number of Old World hays to America—orchardgrass, bluegrass and perennial ryegrass. In the early 1700s a New Hampshire farmer named John Herd found a tall-stemmed grass growing in a nearby meadow (although it was introduced from Europe) that earned a local reputation as a quality horse fodder. Then, in the 1720s, Timothy Hanson began





author of The Scythe

powered motors."

to mow at ground

level from a standing

position. Most have

Book. "It's a zero-carbon

alternative to using gas-

A properly fitted

scythe allows a person

The long-handled scythe dates back to at least the time of the Roman Empire, and by Medieval times it was widely used across Europe to mow fodder. "The Morgan Library & Museum in New York City has an illuminated manuscript that shows men with scythes and women with rakes in the 16th century," says historian Steven Hoffbeck of the University of Minnesota.

But even today, the scythe is still sometimes the best tool for the job: It can be used to cut grass on wet ground or on steep slopes, where tractors cannot safely travel. Scythes are also still used in poorer parts of the world, where tractors are a luxury. And in industrialized regions, some small farmers prefer to use hand tools on smaller, oddly shaped lots. "Even in Europe today, in some higher altitudes farmers still mow hay by hand and then put it into haystacks," says Hoffbeck.

You might even find a scythe useful for some of

your own chores. "The scythe is still a tool horse owners should consider using around the barn, especially for use in place of a noisy weed whacker," says David Tresemer, with the proper rhythm, the work can seem effortless, says Tresemer: "To use the scythe effectively, you'll use a curving, sweeping motion. Never a chopping

The rhythm, I imagine is much like you'd experience with a horse. It's something you feel more than think about."

motion.

cultivating and selling Herd's grass from his farm in Baltimore, Maryland, and "timothy's hay" soon became established as the dominant species of grass hay in the Colonies.

Farming technologies had changed little since the Middle Ages. The old European plows were heavy and cumbersome, made largely of wood. Thomas Jefferson, during his time as minister to France, spent some time watching these plows at work and began working on a better design. He reshaped the moldboard-the part that lifts and turns the soil-with a curve that he called "mathematically demonstrated to be perfect." The new plow could be pulled with minimal force. A wooden version of Jefferson's new plow was in use at Monticello by 1794, and in 1814, the new design was first cast in iron.

Meanwhile, Jefferson corresponded with and encouraged the work of another innovator, Jethro Wood, who was also refining the plow. In 1819,

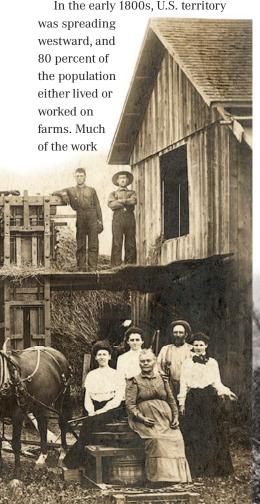
a long handle with "nibs" (handles) to make them easier to hold. It can take some practice, but

patent for his plow, which featured a lightweight, efficient design with a castiron moldboard and interchangeable parts, which meant that a broken plow could be repaired rather than replaced entirely. In 1837, John Deere began mass-producing another innovation at his first plant, in Illinois—Midwestern soil would not stick to his plow's blade, which was made of steel.

But at the dawn of the 19th century, the scythe was still the only way to mow a hav field.

AN AGRICULTURAL REVOLUTION

In the early 1800s, U.S. territory



"Bailey's Mower," 1822, designed by Jeremiah Bailey, was one of the first horsedrawn mowers. The demand for horses strong enough to power

equipment across the growing nation was rising. Draft horses were imported from Europe to help fill the need.

was still done by hand. But the wideopen spaces of the West drove demand for more efficient ways of farming, and a number of new machines were invented.

And, finally, a mechanical alternative to the hand-held scythe came on the scene. Patents for the first horsedrawn mowers were awarded to Peter Gaillard of Lancaster, Pennsylvania, in 1812 and to Jeremiah Bailey of Chester County, Pennsylvania, in 1822. Several similar machines of different designs were patented over the next few years. The first mechanical hay rakes and tedders soon

followed, joined by reapers, threshers, binders, cornhuskers, hullers and a host of other agricultural equipment. And because a smaller number of people could now work larger tracts of land more efficiently, farms began growing into large businesses, shipping their surplus across the continent and even overseas by railroad and waterways.

The demand for horses strong enough to power all of this equipment across the growing nation was also rising. Draft horses were imported from Europe to help fill the need increasing the need to harvest and store hay more efficiently. Transporting and storing loose hay was becoming too cumbersome to meet



the skyrocketing demand.

In the early 1850s, H. L. Emery of Albany, New York, began producing stationary hay presses that compressed dried grass into two- by two- by fourfoot bales that weighed 250 pounds. Over the next decades a number of new machines became available that for the first time turned hay into a commodity that was easily shipped over longer distances and stored compactly on farms. Different machines created bales of varying sizes and shapes, and many required multiple people to operate them.

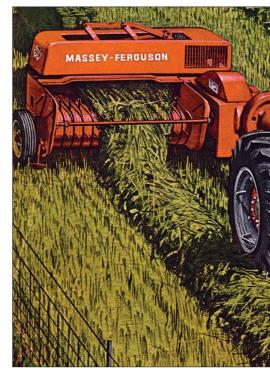
In 1859, immigrants Wendelin and Juliana Grimm settled in Minnesota and planted alfalfa seed they had brought with them from Germany. By selecting and replanting seeds only from the hardiest plants, they developed a strain of alfalfa that would withstand harsh Northern winters. Virtually all the alfalfa currently grown in the United States can be traced to the seed the Grimms carried with them to America.

FROM **DRAFT TEAMS**TO **TRACTORS**

By the end of the 19th century, steam engines were beginning to power a variety of farm equipment, and in the 1890s, Iowa inventor John Froelich invented the first gasoline-powered tractor. But the transition from horse-drawn to gas-powered farm machinery would take decades.

"The key element would always be if the farmer could afford to buy the new equipment," points out Hoffbeck. "It was a big change to go from

By the late 1930s, automatic string balers were becoming widely available. These automated the process of hay baling, including tying off the bales, and standardized the familiar square bale we all know so well.



horse-powered farming to tractorpowered farming. But, if a farmer did not modernize he'd probably have to get out of it because his neighbors would be more efficient. The farmer who did not modernize would find his neighbor buying up his farmland."

By the late 1930s, automatic string balers were becoming widely available. These automated the entire process of hay baling, including tying off the bales, and standardized the familiar square bale we all know so well. Hay had truly come of age, but many of these machines were dangerous as well. "One

Different machines created bales of varying sizes and shapes, and many required multiple people to operate them.



Baling Press

EQUUS 450

<mark>1903 Eli Steel</mark> Case Belt Power



mistake could cost you your life," says Hoffbeck. "Farming was and still is one of the most hazardous occupations in the United States because of the nature of the equipment and the fatigue of long working hours."

Still, Hoffbeck recalls the era with some nostalgia: "Haymaking in those days was part of the seasonal rhythms of the everyday life of the farmer. To grow up on a farm meant you knew what life was about. You were in touch with life, yourself and your family. You worked alongside each other and you spent more time with your family."

Lightning Hay Press 1913

TWENTY-FIRST CENTURY HAY

Haymaking has come a long way since the time when each village and town raised and cut its own supply by hand. Today, hay is the third largest agricultural crop grown in the United States, behind corn and soybeans. According to the U.S. Department of Agriculture, 55.7 million acres of land are used in hay production, and the total crop exceeds 119 million tons per year, most of which is used domestically to feed cattle, small livestock and the horse industry. And beyond round and square bales, our choices have been expanded to include hay that has been chopped and compressed into cubes, pellets and other forms.

These days, hay production is becoming much more of a science. "For horses, small square bales should have between a 13 to 17 percent moisture content," says Mike Rankin, a crop and soils agent with the University of

> Wisconsin. "This insures the hay won't support mold growth."

Some farmers are adding preservatives to prevent mold and bacteria. "Propionic acid alone or in some combination with another organic acid such as acetic acid are the most common hay preservatives," says Rankin. "An organic acid, it works by inhibiting growth of aerobic microbes within the hay, reducing microbial respiration, accumulation of heat, dry matter loss and reductions in nutritive value."

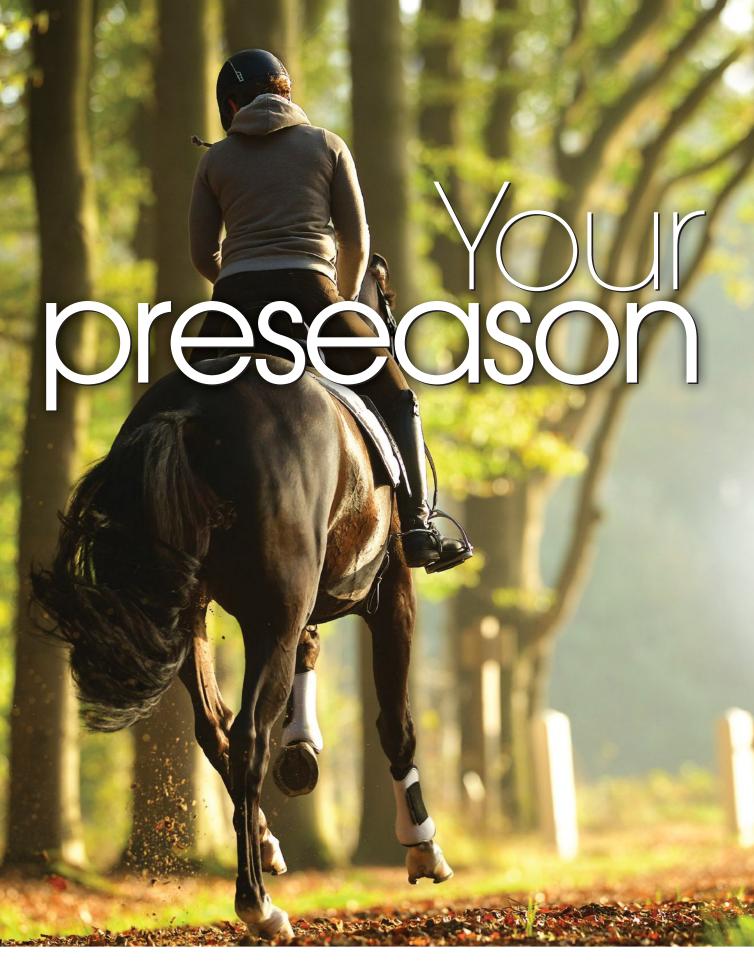
And yet, there is still some art to growing hay as well. No matter how advanced the science of growing, cutting and harvesting hay, a good crop still comes down to the right balance of rain and sunshine: "The problem has been, and likely always will be, the weather," says Rankin.

ay may not be the most glamorous of topics. "But," says Hoffbeck, "there is a certain beauty in the commonplace. After the clover has been mowed and the hay harvested, the plant will grow again. There is a time after the mowing when there seems to be nothing there—but the roots are growing deep and the plant

is still alive beneath the surface

of the ground. When you can take good care of plants and animals you can take good care of people."

Today, hay is the third largest agricultural crop grown in the United States, behind corn and soybeans.





Before the riding and showing schedule heats up, use this five-point checklist to make sure you and your horse will be ready to go.

By Dee McVicker and Christine Barakat

t this time of year, even in the northernmost climes, green shoots are at last poking through the soil in pastures and robins can be seen flitting down fence lines. But at many barns there's another sure sign of spring: riders pulling tack out of storage and restocking their grooming kits in eager anticipation of the first big trail ride,

Those debut outings can be a little rough, though. Horses who are otherwise sensible and sedate may jig and bolt. Others lag behind the group, too winded to keep up. One horse may be tender footed and another so rotund after a lazy winter that his saddle no longer fits. And then there are the practicalities to contend with: leaky buckets, flat tires and crucial travel paperwork that

show or clinic of the season.

somehow got misplaced.

Of course, you'll be able to muddle through, but wouldn't it be nice to skip false starts and frustrations as you get ready for peak riding and showing season? There are no guarantees, of course, but with a little planning and preparation, you can keep unpleasant surprises to a minimum as you get your horse ready for your first major event of the year. To help you, here's a basic preseason checklist-start with these areas and add your own based on your goals and your horse's needs.

HEALTH STATUS

Any horse about to head back to work after several months of relative ease will benefit from a visit from the veterinarian. Not only will a spring checkup take care of routine health-care issues, but it can uncover developing problems that might worsen

later in the season.

You may also want to request a brief lameness exam. A veterinarian may detect mild joint soreness, the slight thickening of a tendon or other subtle signs of trouble that are best addressed early. If anything suspicious appears, ask your veterinarian whether this would also be a good time to take radiographs to look for any changes in chronic orthopedic conditions and to establish a new baseline for comparison in subsequent exams.

This visit is also the time for spring vaccines, giving your horse's immune system a chance to arm itself before insects are out in full force and your horse begins traveling. Which ones your horse needs depends on his age, your geographic location and your plans for the vear. Immunizations against rabies⁰, tetanus⁰, West⁰ Nile virus and eastern⁰ and western⁰ equine encephalitis—the



"core vaccines"—are recommended for all horses, but your veterinarian may suggest additional shots to protect against strangles, influenza or other diseases based on your horse's particular risk.

If your plans include traveling to shows, clinics or other organized events, you'll want your veterinarian to pull blood for a Coggins⁰ test and prepare other necessary health paperwork that such venues generally require. Look into what you'll need well in advance—some shows and other venues have new requirements that include specific vaccinations. Make multiple copies of

If you plan to travel to shows, clinics or other organized events, you'll want your veterinarian to pull blood for a Coggins test and prepare other necessary health paperwork that such venues

generally require.

these right away. Keep one set in your truck and another in your tack box to increase the odds of being able to find a set when you need them. Keep the originals in the house for safekeeping.

2. WEIGHT

Weight gain and loss can be easy to overlook under winter blankets and heavy hair coats. Weight changes affect everything from saddle fit to systemic health, so you'll want to get a clear idea of your horse's status and decide how you'll manage it well before your first competition, event or major trail outing.

Get a literal "feel" for how much body fat your horse is carrying with a vigorous grooming session using a curry and your hands. Consult a body⁰ condition score chart if you're unsure of the meaning of deposits

> over various anatomical points. A target score for most

horses is between 5 and 6.

Also pay attention when you tack up. Weight loss or changes in muscle tone can cause the saddle to bridge across the back or pinch his withers. Even if it fit perfectly fine last fall, assess your horse's tack as if it were brand new and be prepared to make accommodations until his body condition normalizes: Often, you can "shim" with pockets of padding or use a swayback pad that will raise the saddle up off the back until your horse returns to his usual fitness level. If your horse has gained considerable weight, you may have to temporarily substitute another saddle that has a wider tree.

You may also be tempted to make immediate adjustments to your horse's diet. But be mindful of how his lifestyle and environment may be changing in the coming months. For instance, pounds may melt away as a horse's workload increases

even if you don't reduce his grain ration. And a return of spring pastures may help a lean horse fill out in the coming weeks. Talk to your veterinarian before making any nutritional adjustments (that first veterinary checkup is a good time to have the conversation) and then implement any recommended changes slowly.

If your horse has a history or risk of arthritis, look into the benefit of starting a joint supplement while you are considering diet and nutrition. A "loading" dose of a supplement you are currently giving may also be appropriate in the weeks leading up to a return to work, but don't make any such adjustments without speaking to your veterinarian first.



3. FITNESS

How much conditioning your horse will need to return to peak form depends on his previous level of fitness, how he spent his downtime and your performance goals for the season. If he has been turned out all winter long in an active herd with space to run he may have retained some of his fitness. You can get back into a regular riding routine with such a horse much more quickly than you can with one who spent most of his winter days confined to a stall. The natural exercise of pasture living, however, won't prepare a horse for the collection, bending, lateral flexion or mental focus that may be required of him in a discipline-specific event.

No matter your sport or discipline, reconditioning starts with slow work—walking and jogging. On your first ride, limit your time in the saddle to less than an hour at this slow speed. Then, over the course of several weeks, increase the speed or distance of your rides, but never both at the same time. Pay attention to your horse's level of fatigue. You'll need to push him a bit to increase his fitness, but be careful to avoid exhausting him. A return to fitness will stall if a horse needs weeks or months off to recover from an injury.

A heart rate monitor can help you keep track of your horse's increasing fitness: A well-conditioned horse's heart rate will usually return to below 60 beats per minute within 10 or 15 minutes of stopping exercise. But remember that it's not just cardiovascular fitness that matters. Your horse's tendons, bones and ligaments need time to adapt to the demands of work as well.

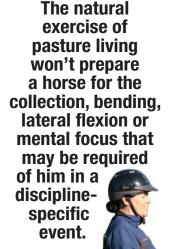
Be sure to add in recovery days to your fitness regimen. A horse's body will rebuild stressed structures during downtime, which leads to the increased strength you're aiming for. You'll need to work a horse at least four times a week to improve his fitness, but at least two very easy rides or completely off days in the pasture are equally important.

After a few weeks of foundation work, you can add in discipline-specific skill work, such as jumping, spins or stops. Avoid repetitive drills. Not only do they stress a horse physically, but they can cause him to burn out mentally before you even hit the show circuit. Changing up your daily routine not only keeps a horse emotionally "fresh" but challenges various part of his body physically.

4. TRANSPORT Whether your first

big event of spring is a clinic, show or organized trail ride, chances are you'll need to trailer to the location. Don't wait until the day before to give your rig a once-over, though. An unsafe or unusable trailer will make all your horse-specific preparations for naught.

If you're not mechanically savvy, you may want a mechanic to take a look at your trailer if it has been parked all winter. If you're comfortable doing the inspection yourself, however, you can work through the vehicle









on your own, looking for trouble spots.

Start by ensuring the hitch is still easy to operate and that the welds that attach it to the trailer look solid. Any cracks are a serious concern and need to be addressed before you do any transport. Next, walk around the trailer to check the tires. Dry rot may have set in over the winter. You'll recognize it by tiny cracks in the rubber. Tires with dry rot need to be replaced, as do any with treads worn down to less than a quarter-inch deep. If the tires appear to be in good shape, make sure they are inflated to the correct PSI, which should be listed on the sidewall.

Inspect the ramp, making sure it's easy to raise and lower and is extremely steady underfoot. Look for corrosion in the springs and hinges. Similarly, swing all doors and windows to see whether they move easily.

over winter can cause wood floors to rot and metal to rust. Use a screwdriver to check the integrity of both types of floor; if the tip goes into the material, it needs to be replaced. With a friend's help, test the brake lights and turn signals. Then check that your trailer breakaway line is secure and works so that should your trailer separate from your truck while on the road, your trailer

If the tires appear to be in good shape, make sure they are inflated to the correct PSI, which should be listed on the sidewall.

will safely come to a stop.

Finally, make sure your horse still loads willingly. If he was a hesitant loader before his winter break, he may have fallen into bad habits. But even a seasoned traveler could do well with a reminder session before you're running late on the morning of an event.

If you trailer long distances or frequently, ask your veterinarian about your horse's risk of gastric ulcers and whether he may need medication on trailering days.

5. GEAR

Spend an afternoon going through and inspecting your gear, from tack to buckets to sheets to grooming tools. Even if you think it was in good shape when you stowed it last fall, you may not have noticed early

signs of failure, or its

have deteriorated over the past few months.

Lay out your horse's summer wardrobe over a fence line. This airs the items out while giving you a chance to notice any signs of rodents who overwintered in their depths. Check sheets, saddle pads, traveling boots and other such garments. Wash any that seem less than clean and make arrangements to repair and replace items as necessary.

Do the same with your grooming tools. Lay them out, clean them up and repack your box with the coming activities in mind. Now's also a good time to order fly spray so you're not caught without it on the first buggy day of the year. Then check season-specific equipment that may have gone unused over the winter. The water containers you keep in



important to scrutinize tack closely. A failure of a stirrup or girth can be dangerous.

have cracked in the cold. You'll want to know that now, not when you're loading up to hit the road.

It's especially important to scrutinize tack closely. A failure of a stirrup or girth can be dangerous. Check every spot where leather meets metal; tack often fails at these stress points. Any cracking or tearing is cause for replacement. Tug, wiggle and pull all hardware, looking for signs of insecurity or weakness. Also inspect stitching and lacing, which is typically an easy-enough repair, assuming the leather itself is still in good condition.

he adage, "If you fail to plan you plan to fail," might seem a little overwrought when talking about a return to riding this spring, but there's certainly some truth to the admonition. An easy transition from idle to active with your horse involves many steps, variables and opportunities for things to go amiss, so the sooner you can start, the more time you'll have to reach your goal. Then, when you enter the ring or head down the trails, those weeks for preparation will pay off.

EQUUS thanks Ann Swinker, PhD, extension horse specialist at Pennsylvania State University, and Diana and Lindsay Peaton of Desert Skies Performance Horses in Gilbert, Arizona, for their assistance in the preparation of this article.





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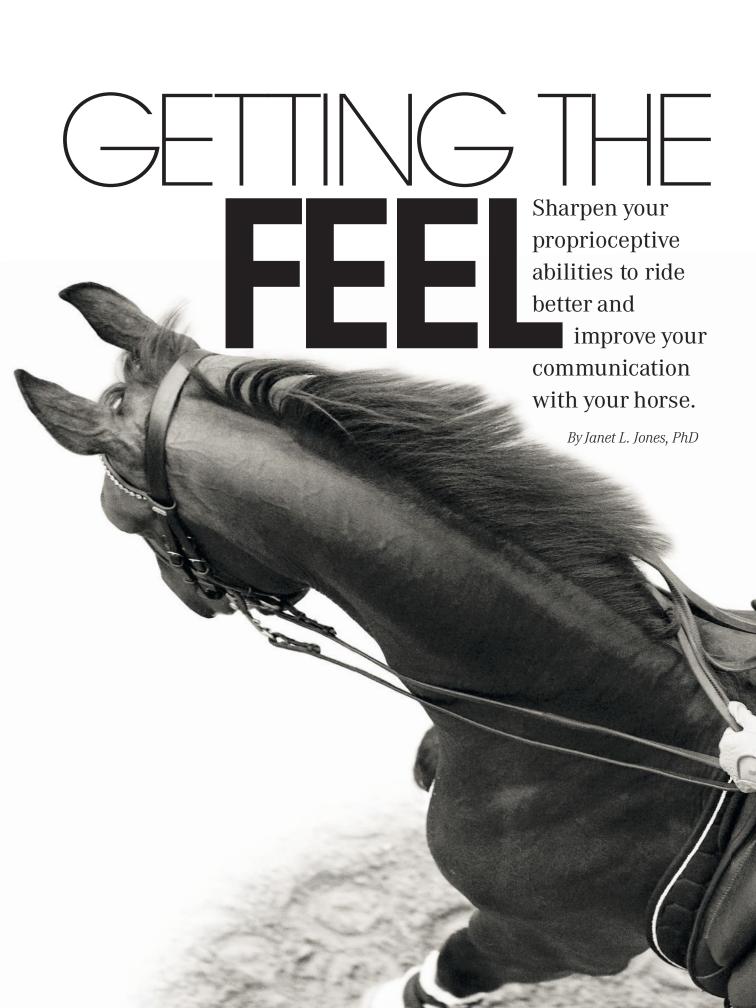
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ast month, we considered proprioception—the brain's awareness of body location, pressure and movement. Proprioception works much the same way in *Homo sapiens* and *Equus caballus*, and it can be adjusted to similar levels of sensitivity. Of all senses, it allows riders the most direct communication

not tuned as precisely as they could be. But with a little work, we'll press them into shape.

You might wonder why such small discrepancies need to be addressed. If your brain thinks your left shoulder has moved back an inch, same as your right one, but in fact it has moved back two inches, so what? The answer is that you need to match your horse's proprioceptive sensitivities if you hope to enhance his understanding of your movements. And horses are exquisitely sensitive animals.

The average horse weighs 50 million times more than the average fly but immediately feels the pest settle on his body. A hypothetical human with that degree of sensitivity would feel the weight of five unseen dandelion seeds. Trained horses can detect from two yards away a nod of the human head that measures only 8/1,000 of an inch in displacement. That's two-and-a-half times more sensitive to visual displacement than we are. Faced with the same nod, humans wouldn't even know it had occurred. One more statistic: At the withers, a horse can detect .0003 ounces of pressure from one nylon filament-the weight of about three grains of sand. Push the same filament into your fingertip, and you'd have no idea it was there.

With this level of sensitivity, horses notice the difference between one inch of your shoulder movement and two. And they're trying to figure out what it means. If you fail to sharpen your proprioception, your horse becomes confused by the mixed messages.

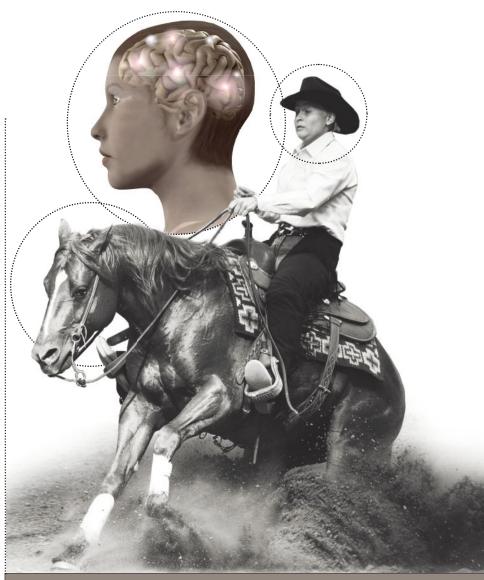
A secondary issue is at work here, too: We have to ride by feel, not sight. Vision often interferes with proprioception. For example, asked to walk at a normal pace and stop with both feet toeing an imaginary line, most people will look down at their feet to accomplish the task. But our brains can direct our bodies without eyesight, if we let them. Vision cheats your proprioceptive system of the chance to do its work.

So, equestrians hone proprioception not only because our mounts are supersensitive but because we can't watch our bodies or our horses while we ride. Proprioceptive training teaches your brain to align your joints, maintain your balance, isolate muscles for independent use, and regulate their flexibility and strength in ways that promote bilateral communication between horse and rider.

UNDER THE HOOD

Specific neurons receive and interpret proprioceptive signals from each area of the body. In general, this process works just fine. But we all have a muscle here or a joint there that doesn't always function as it should. With time, the brain cells that regulate those slackers also become lazy, which perpetuates the problem.

Proprioceptive training has two effects on brain tissue: It forces sluggish neurons back to work controlling a given body part, and it recruits new neurons to help with the task. Neural recruiting helps blind people comprehend speech almost three times faster

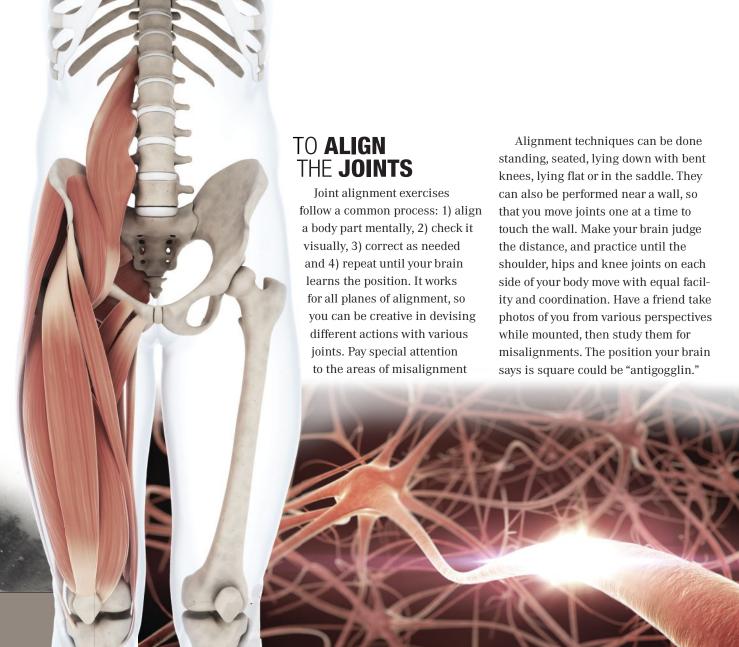


Just as guitar players and taxi drivers form musical and spatial brains, riders can build equestrian brains.

than sighted people do. That's because their brains take spare neurons from unused visual cortex and conscript them to auditory use. Likewise, a rider's goal is to commit more brain cells to body parts that are important astride a horse. The brain will recruit only under duress, as a teenager cleans her room only under threat of sanction. When we insist that our proprioceptive neurons do their job, they're eager to work.

Head scans of guitar players and taxi drivers show that training builds brain tissue. For instance, neural real estate committed to controlling the left fingertips is much larger in people who play the guitar compared to those who don't. Keith Richards' brain bulges in this area; mine sags. London taxi drivers, who memorize over 25,000 city streets twisting in every direction, have more gray matter than average in the spatial memory zones of their cortex. Training—not innate talent or inborn anatomy—causes this effect. Just as guitar players and taxi drivers form musical and spatial brains, riders can build equestrian brains.

Because proprioception is improved through physical movement, people often assume that proprioceptive training is all about strengthening muscles and building physical balance.



Those results are merely side effects. Physical fitness is critical for good horsemanship, but let's save that topic for another time.

What we are exercising today are nerves and neurons. Proprioceptive nerves include muscle spindles, joint angle receptors, and Golgi tendon organs that send impulses from a body part to the brain. Proprioceptive neurons inside the brain receive and interpret those signals. To shape these nerves and neurons, you'll place your body in varied positions, then focus mentally and require your brain to do the heavy lifting. Ready? Let's get to work.

that you identified last month.

To start, just stand in front of a mirror with your eyes closed. Square your shoulders so that each one feels the same distance from your ears. When your brain says they're aligned, open your eyes and look. Are they? If you're off by a smidge, close your eyes and readjust until both shoulders are in line. Try to memorize the aligned position. Use the same technique on your elbows, hips, knees, ankles and feet. Align, check and correct for a few minutes every day, and within a week you'll see results. When your mental alignment is accurate at a standstill, try walking or bending into position.

FOR BETTER **BALANCE** ON THE **GROUND**

Balance matters on a horse—a hint of unplanned forward or backward movement in a jumper rider's upper body can make the difference between a clean leap and a dirty stop. Have you ever catapulted off a horse after a hard refusal? It smarts. And it's not great for your neurons, either.

Here's a good exercise for improving your balance: 1) Stand on one foot with your arms extended to the sides.
2) Focus on an eye-level point in the distance, without using a mirror. 3)
When you can stand for 30 seconds on

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each foot, try it with your arms at your sides, then with your eyes closed. Advance to increasingly pliable surfaces like a thick mat or a balance disc. (It looks like a puffy dinner plate with rubber nubs.) When you've mastered those, stand one-footed on the round side of a BOSU half-ball. Eventually, proceed to the flat side of the half-ball, then to a balance board (a small platform mounted on a hard ball). Be careful as you try new surfaces; we want to build proprioceptors, not bruises.

Leaning also tunes proprioception. Stand with your feet shoulder-width apart, about two feet from a wall. Keep your hands near your waist just in case you need them for support. Lean forward (toward the wall) with your eyes closed until you are just about to lose your balance, then lean back into standing position. Lean to the left and right side, to all four 45-degree angles, and straight back, moving your stance each time so the wall is available to catch you. Lean farther as your brain calls in extra neurons for backup.

For equilibrium in a riding position, sit on a large fitness ball that lifts your feet off the floor when you straddle it. Lean slightly to varied directions with your upper body, trying not to touch the floor with your feet. Instead, use your brain to readjust the balance point from moment to moment. Take it easy: Big balls look solid, but they can squirt out from under you like a racehorse from the starting gate.

TO IMPROVE BALANCE ON HORSEBACK

Balance at a standstill is one thing—balance on a moving horse is quite another. Start by riding in a two-point position. Raise your seat slightly above the saddle with your shoulders in line with your knees. This works in both

Proprioceptive training has two effects on brain tissue: It forces sluggish neurons back to work controlling a given body part, and it recruits new neurons to help with the task.

Western and English saddles—you and your horse are seeking mutual balance regardless of the tack between you.

Form matters here, because bodies cheat to compensate for proprioceptive deficiencies. You can experience this phenomenon for yourself. Stand at a halt in two-point position. Move your feet slightly forward, and your seat will immediately fall, swinging your weight back into the saddle. Move your feet backward, and your upper body will tilt toward your horse's neck. Notice that only a fraction of an inch of foot movement makes a big difference in your upper-body balance, even at a halt. Tall riders have even more trouble because there's so much length above and below

the fulcrum of their hip joints.

There's no sense training your proprioceptors to hold an unbalanced position, so invest in a lesson to learn two-point or have your buddy snap a side-view photo while you maintain it. Use the photo to compare your position to the ideal. When you feel solid in a two-point at the walk, practice it at the trot and canter. Over time, learn to hold the position during curves, gait transitions and lateral work, too.

For intermediate riders on calm steeds, bareback riding helps the brain match your center of gravity to your horse's. It also teaches the proprioceptive signals our horses send to us—they're easier to feel without a saddle in the way. Sensing the details of your horse's body movements is the first step on the road to effective two-way communication between human and equine proprioceptive systems. Practice in a confined area like a round pen before moving to wide-open spaces that invite misbehavior.

Use a lightweight bareback pad for friction if your horse has a slippery coat, and add a saddle pad underneath if he has high withers. Start at a walk, but aim in the long run to do everything bareback that you can do in a saddle: walk, trot, canter, transition, jump, halt, spin. Focus on the mental aspects of this work—think yourself into balance and alignment, making your brain choose accurate positions while noticing the movement of your horse's body.

Finally, for advanced riders, have a trainer longe a quiet school horse while you learn to walk, trot and canter without reins or a saddle. Eventually, you will be able to close your eyes and make those proprioceptive neurons sweat. Top equestrians develop independent seats by riding on a longe line or in a chute bareback, blindfolded and



reinless. If you shoot for this level of proprioception, approach the goal slowly with an experienced trainer.

MUSCLE ISOLATION

Most muscles work together in large groups, so the brain has little need to isolate a given muscle and use it independently. Until you become an athlete, that is. Equestrians need control of specific muscles and often must flex one muscle while relaxing another within the same functional group. Our brains have to be taught to manage this, so isolation feels weak at first but rallies as the noggin recruits extra neurons to help with the task.

To get the idea of muscle isolation,

lie flat on your back. Flex, then relax, your entire thigh. Not your whole leg and not your keister—just the thigh. Good job. Now, let's get down to proprioceptive business: Flex and relax only the inner thigh. That's harder, but keep at it even if your brain only allows a feeble contraction and release. At this point, we just want our brains to turn on a few fibers in the inner thigh and nowhere else. Do the same for the front, the outer side, and the back of the thigh in turn, trying to get a mental "grip" on each area. Aim for a delicate touch; we're specializing neurons here, not crushing iron.

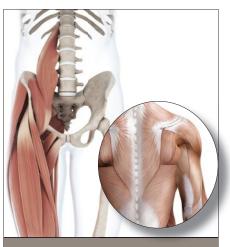
Play with muscle isolation all over your body, just to get the feeling of how

As your proprioception improves, pulse the muscle by tensing and releasing rhythmically. Progress by isolating the muscle further—the calf, for example, is actually comprised of three muscles that can be controlled separately by your brain. Instead of housing a stable full of generic "calf" neurons, you want to develop inner, outer and middle calf neurons.

When you've got the general idea, teach your brain to isolate muscles that are especially important for riding. Let's double down on teres major as an example. Teres major is the fancy Latin name for a small muscle at the back of each shoulder just below the armpit. It opens and steadies your shoulders and

upper back as you ride. Now, it's true that you can also steady those areas by flexing the entire shoulder and upper back-but this is one of many global tensions that causes the beginning rider to slap up and down at the trot like a concrete mannequin, while the school horse flattens in an effort to evade pain. We want to move with our horses, not against them. And we want them to stay calm, which they can't do if we're tight. Isolate teres major, and you'll be able to lift and stabilize your upper back while remaining relaxed. You can also rate your horse's speed with teres major, slowing your spunky fireplug without pulling on his mouth.

Other key equestrian muscles include the medial soleus which, when controlled separately from the calf, can suck a horse's abdomen upward to boost impulsion and enhance engagement. The quadratus lumborum, if isolated from the upper hips, allows us to sit deep in the saddle at the canter and



Teach your brain to isolate muscles that are especially important for riding.

swing freely with a horse's motion. Overachievers can isolate the outer thighs from the gluteal muscles, to create an equestrian seat independent from the legs. This isolation places female seat bones on the horse's long back muscles for the perfect weightbearing position that softens his back and increases his power.

GRADATION OF **PRESSURE**

Once a muscle is isolated, teach your neurons to contract it with precise gradations of pressure. Suppose you've schooled your brain to flex and relax the inner thigh independently. Now, try tightening the inner thigh very gradually. Instead of turning the flex faucet full on, ease it open one drop at a time. At first, the acceleration will feel jerky and sporadic as if the water line is spitting air. But with practice, the change becomes smooth and refined. Perfect this technique on horseback, and you can almost hear your horse's muscle spindles and Golgi organs say "ahhh."

You can use gradation to press the horse into a new movement like silk,



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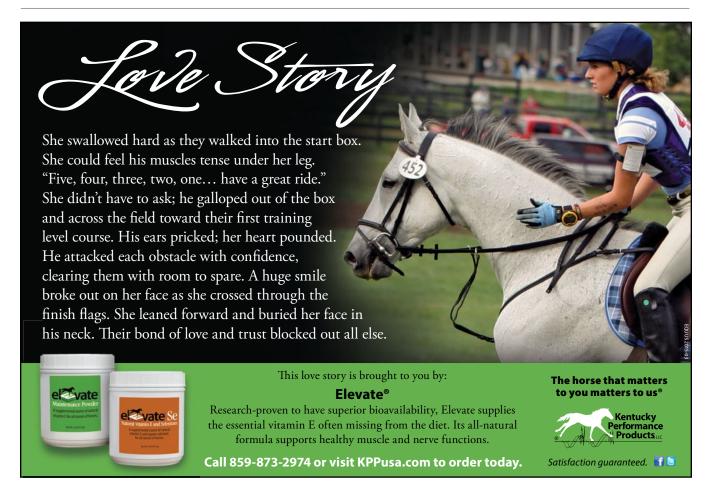
rather than clamping him into a tsunami of motion. Practice creating the entire range of pressure, from none to the tightest contraction possible and back again to none. Most equestrian brains need greater work in the lighter half of the range.

If a proprioceptive neuron doesn't have to be precise, it isn't. It will fire in response to a large range of tensions, like flipping a crude on/off switch. To foster precision, we have to expose those neurons to gentle muscle pressure. They'll calibrate their sensitivity to match your needs, each becoming tuned to an exact range of flex and stretch. They're specializing themselves for horseback riding and enlarging brain regions that control equestrian muscles and tendons. And-good news-with daily practice, noticeable improvement shows up in a few weeks. You can continue beyond that as far as you like because the brain's capacity for improvement is endless.

with better proprioception, you'll have faster reaction times, greater coordination and superior balance. You'll begin to feel your horse's body, noticing with the muscle spindles and joint angle receptors of your seat, for instance, the relaxation or tension in his torso. You'll feel where his legs are and how they move under you. Feeling the action of your horse's legs, back and sides is the precursor to controlling them, especially in complicated maneuvers.

These improvements enhance equine proprioception as well. Your horse's brain will become more sensitive to your aids because they are now easier for him to recognize. He will respond more quickly yet remain calm as your correction and release become gradual. Best of all, the two of you will begin to communicate through the medium of your bodies, with your movements travelling straight to his brain and his to yours. Enjoy the feeling.

About the author: Janet L. Jones earned her PhD in cognitive science, the study of the human mind and brain. She won UCLA's dissertation award for her research on brain processes. Now professor emerita, she has taught the psychology and neuroscience of memory, language, perception and thought for 23 years and is the author of three books. Jones began riding at age 7. She has competed in Western, English, reining, halter, hunter and jumper classes in five states and uses the principles of dressage with every horse. As a junior rider, Jones medal-qualified for the United States Equestrian Team program. She schooled and showed green hunters and jumpers at a large training stable for many years. Jones currently owns a 17.1-hand off-the-track Thoroughbred who makes every day interesting. She trains horses and riders at Riversong Ranch in Durango, Colorado. Readers can reach her at ridewithyourbrain@gmail.com.



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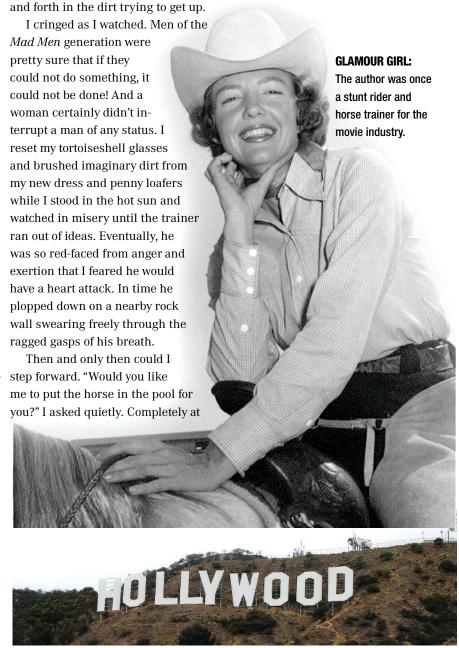
A sweet-natured gelding once taught me that the impact of kind words and a gentle touch can last a lifetime. By Martha Crawford Cantarini

By Martha Crawford Cantarini

'n 1965, I swept aside my own horse career-as a stunt rider and horse trainer in Hollywood movies -and married a jockey. My new husband had just been contracted to ride for an 18-horse stable at Arlington Park racetrack in Chicago, and so we aimed our new green Buick eastward for the coming race meet.

Shortly after we arrived, we were invited to a press event. By then, therapy swimming pools for horses were the norm at racetracks back in California, but the first was about to open in Chicago. This was such a novelty that reporters and photographers from the Chicago Tribune and other papers were there to cover it. A leading trainer from California had been selected to bring a horse to be used to demonstrate the new pool. The barn's gentlest racehorse was selected to take the first swim, accompa- step forward. "Would you like nied by an exercise boy who was a very good swimmer. When the big moment came, a groom led the horse forward. But when they reached the water's edge, the horse balked-he would not go forward into the pool!

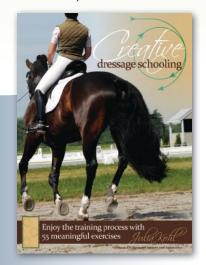
After many awkward moments, the horse's trainer grabbed the shank from the groom. He put the shank chain in the horse's mouth and began to fight with the frightened gelding. The man jerked so hard that the Thoroughbred reared and fell over backward: Blood ran from his mouth profusely as he scraped his head back



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a loss and so humiliated he couldn't speak, he just nodded. "OK," I said. "Give me a rope and 20 minutes."

Their curiosity piqued, the press contingent agreed to wait for me. First I removed the stable halter and let the blood-stained shank drop to the ground lest the horse associate them with his recent fear. Then I fashioned a makeshift halter and lead from the rope and led him over a little hill out of sight. In my wake I heard a few snide remarks about women babying horses. I ignored them and proceeded to become a friend to a lovely Thoroughbred who really did need one at that time. I talked to him softly while I cleaned the blood from his mouth and dirt from his pretty white face with a bit of material from my dress. Within 15 minutes I had taught him to come to

Within 15 minutes I had taught him to come to me and put his head on my shoulder when I clucked.

me and put his head on my shoulder when I clucked. He learned quickly, even eagerly, because he finally understood what he was being asked to do. I rewarded him intensely with my hands and voice before I led him back.

The murmuring crowd fell silent as we returned and walked straight to the pool. Without pausing, we walked one step at a time down the ramp into the water—the beautiful horse laid his head on my shoulder in answer to my clucking and followed me without hesitation.

Seemingly in slow motion the ramp collapsed into the deeper water, as it was designed to do. I heard a few gasps: A few eyes fell on my expensive dress as it swirled about me in the water. At the end of the ramp the water reached swimming depth, and I handed the shank to the exercise boy

who was already in the pool. With a big swooosh both he and the horse were soon swimming around the perimeter of the large round pool.

As he came back around, I thought I saw the horse eyeing the ramp as I made my way back up. To divert him away from the exit, I waved my arms and told the trainer to wave his. Pretty soon, we were all waving every time the swimmers came around, and the cameras flashed.

"By the way, what's his name?" I asked the trainer, pitching my voice to be heard over the applause.

"Keep Waving!" he replied.

"I *am*," I protested, "but what's his name?"

Keep Waving was the horse's name! The story and the pictures earned a spread in the *Chicago Tribune*, and for the rest of the Arlington meet that year, Keep Waving was the horse of choice to demonstrate the new swimming pool.

A few years later, my husband was riding in Canada, and we were having dinner with his agent, a former trainer. We were swapping stories about horses we had known when the agent commented about a very sweet horse he had once met who, he remarked, "did the darnedest thing. Every time I cleaned out his stall, I would cluck to ask him to move over. Instead, he would come to me and put his head on my shoulder."

I couldn't believe what I was hearing! I asked, "Was his name Keep Waving?" It was.

These memories make me cry. I had no idea that those few moments I spent with Keep Waving made an impression on him that lasted the rest of his life. But, I have always thought that what occurred between us those many years ago best exemplifies my own attitude about my personal world of horses. Sometimes, as with Keep Waving, I was honored to be a horse's healer and guide. Sometimes, a horse was both healer and guide for me.



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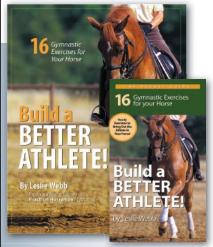


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MANAGEMENT **Keeping a muzzle on**

My overweight, easy-keeper
gelding should wear a
muzzle most of the year. The
problem is that he is very crafty at getting the muzzle off his head. He has used
a hook and the fence to catch and rip off
muzzles, destroying them in the process.
His latest scheme is having his herdmate
grab onto the muzzle with his teeth and
pull it off. What can I put on the muzzle
to deter his buddy? Is there something
that would taste bad but not be harmful
to the skin or the horse if he ate it? Any
help would be appreciated as I don't
want my guy to founder or colic.

Amy Swing Newark, Delaware

Muzzles that limit or prevent

• grazing are important to

• protect the health of many
horses and ponies, but they are a hard
commitment for us humans. Good for
you for persisting!

One effective way to help keep a muzzle on is to add a browband and throatlatch from an old leather bridle. For safety, these should be breakable in case your gelding really does get hung up on something. I would suggest using high-visibility tape to hold those parts to the headstall of the muzzle and also to help with your search in case of failure.

As for your question, yes, there are nasty-tasting things you can apply to repel your gelding's accomplice. I would suggest bitter-orange- or bitter-apple-flavored liquids that you can get from many small-animal veterinarians or pet stores. Be sure it has dried completely before you use the muzzle so that the liquid doesn't get in the wearer's eyes.

And be very careful not to get any close to the actual bucket area of the muzzle—that would be a strong deterrent against him putting his head back in there again! I would also suggest waiting until a time when there is no rain in the forecast during turnout times for a few days, just to be sure the repellent cannot wash down into the muzzle.

I would avoid the products sold to put on wood and stall surfaces to protect against chewing—these are so strong that they might add to your horse's motivation to lose the muzzle for himself, and for some individuals they can be skin irritants.

If these strategies fail, and a dry lot is not an option, you could consider muzzling your horse's buddy, too. Good luck keeping the muzzle on! I am sure your horse would thank you if he really understood the stakes.

Melinda Freckleton, DVM Haymarket Veterinary Service Gainesville, Virginia

MANAGEMENT When to stop blanketing

This winter I had to blanket
• my 27-year-old horse, Dusty,
• for the first time in his life,
and I don't know when to take it off. Any
advice you can offer about when to stop
blanketing a horse in the spring would
be welcome.

Belinda Titus Haymarket, Virginia

A lot of older horses need

a little extra help to stay
warm during a rough
winter, just like you did for Dusty.
Still, it is important to avoid overblanketing, and as the roller-coaster
ups and downs of spring weather
arrive, you will have to put the blanket

on and take it off fairly often.

As a simple rule of thumb, to decide whether to blanket your horse on any given day, I like to just compare it to what I am wearing. If I need a parka to stay warm, an older horse like Dusty might need a blanket. If I can shed my own winter wear and head out with just a light jacket or sweatshirt, then I'd leave my horse's blanket off.

As I'm sure you've noticed, blanketing is a lot of extra work. A couple of times a day you'll have to check that it's still sitting correctly on the horse, and you'll need to remove it to groom.

Of course, once we start getting consistently warm days, it'll be time to take the blanket off and leave it off. Letting your horse get slightly chilled is not nearly as worrisome as having him sweating under a blanket on a warm day.

Melinda Freckleton, DVM Haymarket Veterinary Service Gainesville, Virginia **ĕ**

THIS MONTH'S EXPERT



Melinda Freckleton, DVM, is a veterinarian at Haymarket Veterinary Service in Gainesville, Virginia. A graduate of Cornell University's

College of Veterinary Medicine, Freckleton enjoys riding and competing in dressage and taking care of her dogs, cats and horses on her small farm.



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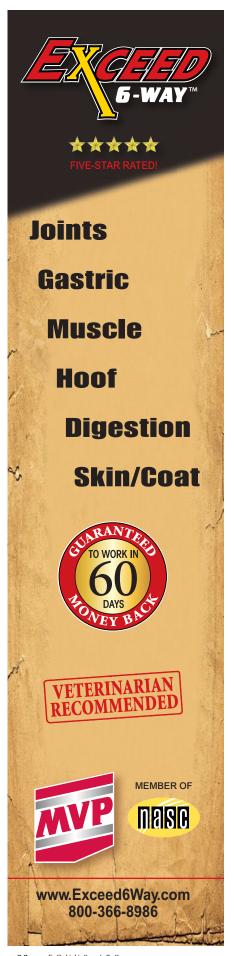


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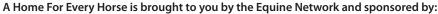
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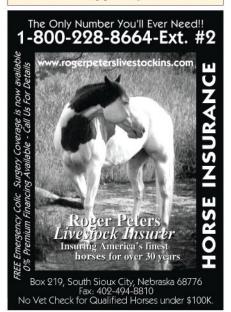
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EDIGLOSSARY

antigen—substance, often a protein, that the body's immune system recognizes as foreign and reacts to by producing an antibody.

body condition score (BCS)—a designation, based on a nine-point numeric scale, indicating the amount of fat on a horse's body. A BCS is assigned after a visual and hands-on appraisal.

carotid artery-main artery running along the horse's windpipe at the underside of the neck. It supplies blood to the head.

Coggins test-laboratory blood test for the presence of antibodies against the equine infectious anemia (EIA) virus.

conjunctiva—membrane lining the inside of the eyelid and covering the exposed surface ("white") of the eyeball around the cornea.

dexamethasone-synthetic corticosteroid that mimics the function of cortisol, a hormone released by the adrenals.

eastern equine encephalomyelitis (EEE, encephalomyelitis)-brain and spinal-cord inflammation in horses, caused by a specific viral strain transmitted by mosquitoes. EEE is characterized by fever and/or stupor and is almost always fatal.

endoscope—small, flexible tube equipped with light and a viewing device; used to examine or operate on body passages or internal organs.

ADDADEL & ACCESSODIES

equine infectious anemia (EIA, swamp fever) infectious disease transmitted by insects, characterized in the acute or chronic stages by intermittent fever, depression, progressive weakness, weight loss, edema and anemia. Horses with the inapparent form show no sign of disease.

equine metabolic syndrome-endocrine disorder characterized by increased fat deposits in specific locations of the body or overall obesity; insulin resistance, which leads to abnormally high levels of the hormone circulating in the bloodstream; and a predisposition toward laminitis in the absence of other recognized causes.

equine protozoal myeloencephalitis (EPM)inflammation of the brain and spinal cord caused by protozoal infection.

fascia-fibrous supportive tissue sheets beneath skin and between muscles.

influenza—acute viral infection involving the respiratory tract. Influenza is marked by inflammation of the nasal mucosa, the pharynx, the conjunctiva, the lungs and sometimes the heart muscle.

insulin resistance-metabolic disorder, similar to type-2 diabetes, that occurs when certain cells in the body become less sensitive to the action of insulin, and normal amounts of the hormone can no longer keep adequate amounts of glucose moving into the cells for use as fuel.

nictitating membrane (haw, third eyelid)—tissue fold which can be drawn over the eye to serve as a third, innermost eyelid.

plasma-blood liquid that contains specialized cells, such as platelets, and the proteins related to clotting; obtained by centrifuging whole unclotted blood to settle out the other cells.

Potomac horse fever (monocytic ehrlichiosis) disease caused by a rickettsial organism, Neorickettsia risticii. Named after the Potomac River Valley where it was first recognized in 1979, the disease is characterized by fever, diarrhea and laminitis.

rabies-acute infectious viral disease of the central nervous system, usually fatal.

serum—the liquid portion of blood remaining after solid components have been removed by

strangles (distemper)-highly contagious infection of the lymph nodes, usually of the head, caused by Streptococcus equi bacteria. The abscesses may become so large as to obstruct the airway (hence the term "strangles") and may break internally, draining a thick, yellow pus through the nose, or externally, draining through a spontaneous or surgical opening in the skin.

tetanus-rigid paralytic disease caused by Clostridium tetani, an anaerobic bacterium that lives in soil and feces.

West Nile virus-flavivirus transmitted by mosquitoes. West Nile virus can infect birds, horses, humans and other mammals. West Nile infection sometimes triggers swelling of the brain (encephalitis) that produces limb weakness, muscle fasciculation (twitching), incoordination, behavioral changes, paralysis and recumbency. In severe cases. West Nile encephalitis can lead to coma and death.

western equine encephalomyelitis (WEE) brain and spinal-cord inflammation in horses, caused by a specific viral strain transmitted by mosquitoes. Signs include fever, depression, ataxia and head pressing.

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EQ BACKPAGE

'd wanted a horse of my own since I was 3 years old, when my grandmother gave me a Breyer Appaloosa stallion. I remember that moment so clearly. It was as if a lightning bolt had struck me with horse-craziness, and I haven't been the same since. Fifty-five years later, I've still got that toy.

I became the kid who bugged her parents for a horse at every opportunity. But it was never to be. As my parents never stopped saying, horses are expensive. Horses are a lot of work. Horses can be dangerous. Over time, I became convinced that I didn't have a horse because I didn't deserve one.

I tried taking lessons as an adult, but I was frustrated by judgmental instructors who had learned the basics when they were children and couldn't understand why I hadn't. I rode rental horses occasionally over the next 40 years, but I felt like a constant outsider in the horse world. It's difficult to learn true horsemanship if you never have the opportunity to build a relationship with a single horse.

Then a friend sent me a link for a nearby stable. They were looking for interns who would help with the stable work in exchange for riding lessons and lease privileges. I stared at the page for a long time, looking for the catch. You mean, you will let me feed, water, groom, muck stalls and sweep the floor and let me pretend I own a horse? And you won't even charge me? I thought I'd stepped sideways into an alternate universe where dreams really do come true.

Still, this wasn't a decision to be

Never too late



Entering the horse world later in life isn't easy, but the rewards are well worth the effort.

By Julianne Lee

made lightly. I'm a type II diabetic with peripheral neuropathy, and I'm overweight. I take medication for blood pressure. My left leg is weaker than my right. I worried that I wouldn't be physically able to keep up with the work—and if I wasn't strong enough to control a horse effectively, the result could be disastrous. But surely the exercise of stable work would help with some of those problems.

Baby steps, I told myself. Journey of a thousand miles....

At first the job was as difficult as I'd feared. The walk from the barn to the

top pasture was uphill, so leading horses to turnout left me breathless.

Often I had to stop and pretend I was admiring the sunset for a moment before moving on. I learned to take everything one step at a time, literally, climbing to the hayloft as slowly as I needed to. I took care the horses wouldn't crowd me even when they were hungry and impatient. Yet I never

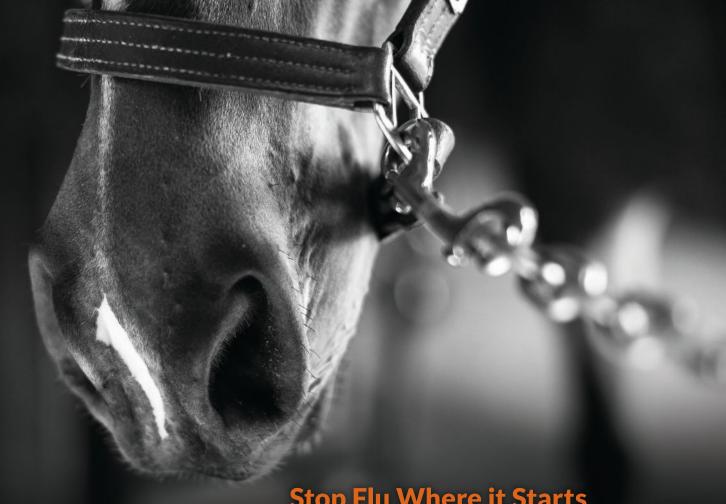
BEST TEACHER:

Pepper, says the author, "is teaching me the lessons of horsemanship I've wanted to know all my life." slacked for being tired or sore. Every time I was out of breath, I told myself that I was up to this task. My parents had always told me I shouldn't

want a horse because they were too much work—I needed to prove to myself that the effort was worth it.

Gradually my weak leg became stronger, and my stamina improved. I lost some weight. I no longer hesitate to move the less well-behaved horses. I sweep the floor in much less time. I can climb to the hayloft without stopping for breath. I love it up there; I've discovered that there's something about the smell of warm hay that is comforting in a way I've never known before.

Best of all, I am able to ride regularly. Pepper, the mare I lease, is a sweet girl. She's only 5 years old, but she's very well trained and always patient with me. She's teaching me the lessons about real horsemanship I've wanted to know all my life. For the first time since I was 15, I feel I might one day be worthy of owning a horse. And that's priceless.



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²Townsend HGG. Onset of protection against live-virus equine influenza challenge following vaccination naive horses with a modified-live vaccine. Unpublished data.





¹ UC Davis (Nicola Pusterla) & Merck Animal Health. Infectious Upper Respiratory Surveillance Program. Ongoing Research 2008-present.





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